

# THE IRON AGE

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## Features of a New Machine Shop

Design of Addition to Works of the Gisholt Machine Company, Madison, Wis.—How the Workmen Earn Vacations with Pay

The Gisholt Machine Company, Madison, Wis., has added to its previous machine shop an L-shaped building fronting 326 ft. on Baldwin street and 234 ft. on Washington avenue that is typical of the most recent practice in shop construction. The accompanying ground plan of the machine shops shows the new addition and its relation to the rest of the plant. The new portion of the shop is made continuous with the old so that the crane operating in the Washington avenue wing of the old shop now operates

The new layout provides for the castings being received at the end of the new Baldwin street wing, which is the point of the shop nearest the foundry and the point where the heavy machine tools are to be located. The general arrangement will then provide for finishing the large castings at the point of entrance into the shop, for moving them across the end of the shop into the general assembly bay and through the assembly floor at right angles to the original direction of travel to the shipping tracks at the



Fig. 1—View Showing the Heavy Machining Bays and Bench Work Bay

continuously over the entire length of the old and new shops combined. With the complete readjustment of the shop to the enlarged capacity a practically continuous movement of the material through the shop will be made possible.

At the present time castings are received into machine shop on the track indicated at the location marked 7 Fig. 4, and the heavy machining is done on the large planing machines placed in the adjoining floor space as indicated at 6.

northeast or opposite end. Parallel with the assembling bay, in the location marked 26, and as is also illustrated in Fig. 1, the hand finishing and bench work on the lathe mountings is to be done, and in the locations marked 8, 19 and 20, the present tools are to remain for the lighter machining operations. When the machine bed casting is then placed on the assembly floor, the various finished parts can be brought from a minimum distance for assembly on the bed.



Fig. 2—Exterior View of the New Portion of the Gisholt Shops

The new building has a roof of saw-tooth design, of which a typical roof truss is shown in Fig. 7. The roofing material is a standard book tile covered with a guaranteed roofing. The upper portion of the lighting panel of the roof is a ventilator section of the Pond continuous sash type furnished by the David Lupton's Sons Company, Philadelphia. The roof troughs are concreted, with a projecting perforated trap through which the water drains into downtakes alongside of the building columns. The roof is carried on built up latticed columns, the vertical members of which are angles. These columns are arranged to divide the end of the shop along Baldwin street into three bays of equal width and along the Washington street side to provide an outside bay and a craneway assembling bay. As indicated in the ground plan, two of the end bays, in which the heavy machine work is done, are spanned each by a 5-ton Pawling & Harnischfeger crane. To facilitate the direct handling of material the runways of these two cranes extend under the span of the main assembly crane which operates at right angles. To provide for the difference in elevation of the crane runways thus made necessary, the roof trusses over the assembly bay have a greater height to the bottom chord as compared with the remaining portion of the new building. This is illustrated in Fig. 3. The machine shop floor is surfaced with concrete.

The end bay of the building is devoted to locker and

wash rooms for the men and to offices for the time and cost keeping departments. The locker facilities consist of individual expanded metal lockers, assigned to the men by number according to the number of their shop checks. Individual basins for washing and shower baths are also provided. A gallery floor is hung in this bay and is given over entirely to the welfare interests of the men pending the completion of a proposed welfare building. One enclosed portion is a theater and auditorium and is illustrated in Fig. 5. This room is devoted to the uses of the men's organization known as the Gisholt Club.

The remainder of the gallery is used as a lunching or lounging place for the men at noon as it is required under the shop regulations that all employed check out and leave the shop at noon hour. This regulation serves the double purpose of enforcing relaxation among the men and also of avoiding the general littering up of the shop in the lunch hour. With the exception of the cost keeping department this end bay is practically devoted to the interests of the men and also includes a completely equipped room for first aid treatment to the injured. The general locker room is enclosed with wire grating and at a convenient place a bulletin board is erected upon which notices of general interest are placed, a list of lost and found articles is published and mail is posted. Sanitary drinking fountains are located throughout the shop conveniently and they possess a distinct feature as illustrated in Fig. 8 in



Fig. 3—Structural Arrangement of the Shop Roof and Crane Runways So That the Two Parallel 5-Ton Cranes Run Out Below the Assembly Crane

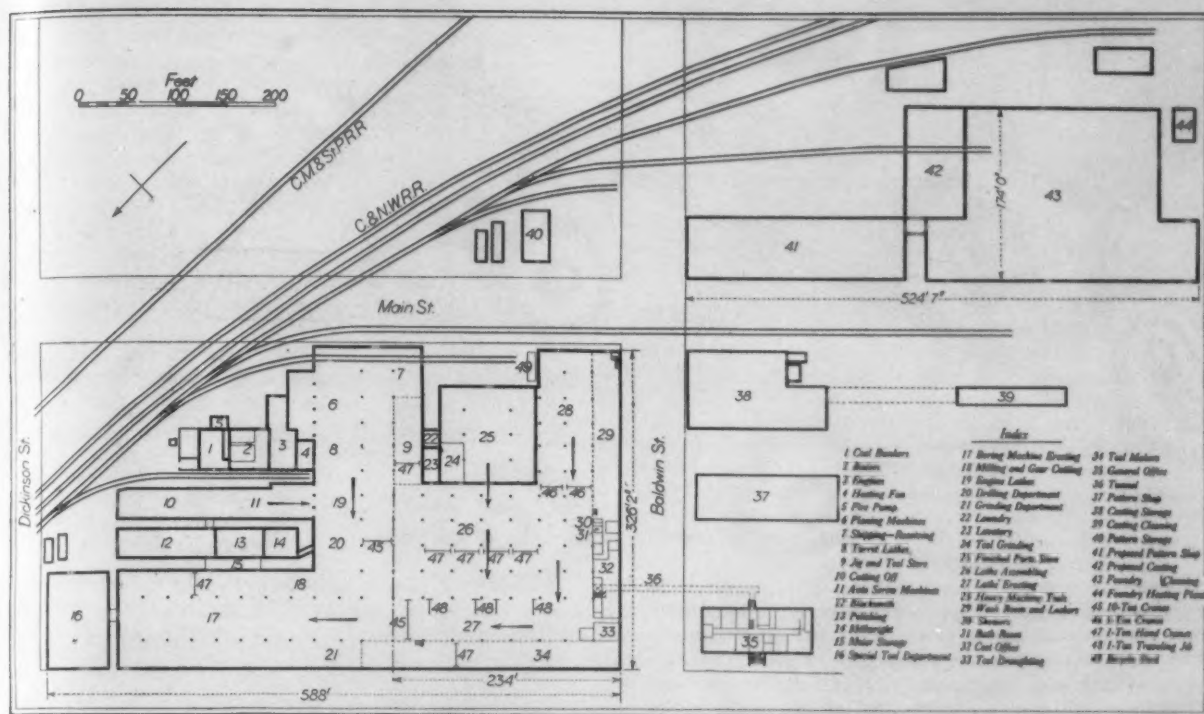


Fig. 4—Block Plan of the Plant of the Gisholt Machine Company

the size of the overflow bowl which is large enough to prevent any splashing of the water over the floor.

Individual tungsten incandescent lights are hung at regular intervals from the roof for the artificial lighting. A view of the assembly bay taken by artificial light is shown in Fig. 9. A unique I-beam insulator clamp from which the light wires are strung is illustrated in Fig. 10. The direct system of heating is used with coils along the wall under the windows and overhead, along the bottom of the lighting section of the roof trusses as shown in Figs. 3 and 6. The windows in the new building are of wire glass with ventilator panels of the type furnished by the Trussed Concrete Steel Company, Detroit. A feature of the roof structure is an extension of the gusset plates punched for the subsequent hanging of framework for shafting and hangers as illustrated.

In the Washington Street wing the bay along the windows is used on the ground floor as a tool room and on the gallery floor for light machine work and fitting. The remainder of the span of this wing is the crane bay which is traversed by a 10-ton Pawling Harnischfeger crane. With the exception of temporary arrangements where the

group plan of drive as in Fig. 9 is employed all the machines in the shop have individual motor drives in which a motor is connected by noiseless chain drive to a cone pulley. A general practice has been adopted for the shop in the use of 220-volt direct-current variable-speed motors with a speed range of 4 to 1, belted to a cone pulley with two or three gear changes of speed. For the accurate finishing of lathe parts a number of the standard Gisholt turret lathes are installed. For the convenience of machine operators, circular cast-iron rotating trays with a bracket mounting directly on the machine housing are used for such tools as the operator is continually requiring.

The distinctive feature of the Gisholt Machine Company's shop lies in the attitude of the company towards its employees as evidenced in the lighting and sanitary conditions of its shop, its wage system and its welfare work. When an employee is hired he is given a small book of shop information and instructions, which, in part, contains the following general information: The employee reports with his "hired" slip to the timekeeper and is instructed by him regarding ringing in and out on the record time clock; is assigned a locker in the locker room, and is taken to the

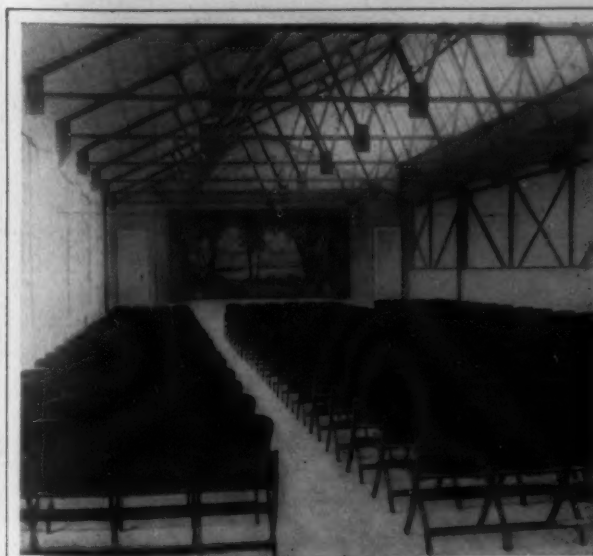


Fig. 5—The Auditorium for the Gisholt Club. The Space Can Easily be Converted for Shop Use, the General Shop Construction Being Adhered to



Fig. 6—View in the Drafting Room, Main Office Building, Showing the Indirect Lighting System in Which Light the Photograph was Taken



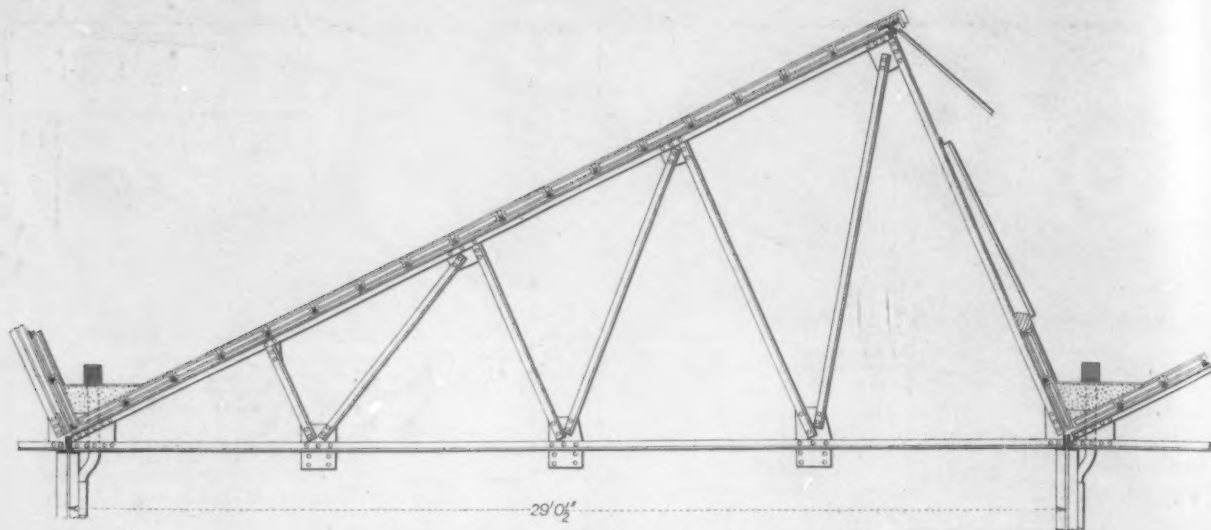


Fig. 7—Structural Detail Showing a Typical Roof Truss

foreman in whose department he is to work. He is furnished with eight brass checks having the same number that the company places special emphasis upon promptness and regularity and in this connection has provided an "extras his clock card and locker. These checks are used in obtaining small tools from the tool room. He is informed of the "extra time" arrangement as follows:

The whistle blows at two minutes of 7:00 and two minutes of 1:00 and all those who have lost no time during the week and have registered on the time clock at or before two minutes of 7:00 and at or before two minutes of 1:00 and who remove their job tickets from their own department racks before the 7 and 1 o'clock whistles stop blowing will get the benefit of an extra hour on Saturday, making 60 hr. pay for 59 hr. work. A man will fail to get the extra hour in case his clock on entering shows 6:59 or 12:59 or later. Furthermore, he also fails to get the extra hour if he registers on the clock card before 6:58 or 12:58, but fails to be in his department before the second whistle stops blowing. In addition to getting the extra hour for prompt attendance during the week, a man who is neither absent nor late during the regular working hours for an entire month will, on the same conditions that entitle him to the extra hour on Saturday, be entitled to one half-day's vacation with pay, but before one can take this vacation he must have earned twelve half-days. If the half-day is lost for one month it does not affect those earned before as they still remain to a man's credit until

he has earned twelve half-days, and he is entitled to a week's vacation on pay, or if he prefers not to take the vacation he is entitled to an extra week's pay. If a man takes the vacation it must be at a time that will be mutually agreed upon, but the week must be taken at one time.

The timekeeper starts each workman with a job ticket giving the order number, etc., upon which the man will work; this job ticket must be changed each time during the day that the job is changed; tickets will be made out by the time clerk for the department and it must have all the necessary places filled in from information obtained from the work card or from the tag attached to pieces upon which work is to be performed. Job tickets are to be deposited in the department racks at noon and night when the whistle blows, but not before. Upon entering any department in the morning or at noon, the job ticket is to be removed from the rack and kept with the operator at all times. If an employee is absent from the shop for any length of time, an "out" card is placed in the department rack and the employee upon returning to work takes this to the time clerk and exchanges it for a regular job ticket.

For the punching of job tickets to show the record of time spent on the various jobs during a day, the Gisholt Machine Company has developed and is about to place on the market a machine called the periodograph. These machines, located conveniently to the various departments of the shop, are connected electrically with a clock in the timekeeper's office. The device records the passage of



Fig. 8—One of the Sanitary Drinking Fountains Showing the Large Bowl



Fig. 9—View of the General Assembly Bay Taken with Artificial Illumination



time in consecutively numbered periods of fifteen minutes each. At the beginning of a week the periods from 7 o'clock on Monday morning until quitting time on Saturday are numbered consecutively and shown on a blueprint sent to the shop. The periodiograph records these periods correspondingly.

The ticket is inserted in the periodograph at the completion of each job and the machine punches the card and marks on it the number of the time period at that interval, opposite which space is provided for recording the order number of the job on which work is done. For overtime work the reverse side of the card is used and this use of the card is immediately indicated by the position of the punch mark which is necessarily reversed as the job ticket can be entered into the periodograph in one direction only. The use of this machine automatically records the actual time spent on each job and requires only that the workman punch the job ticket at the completion of every operation.

The company has in force the more or less common premium system whereby the employee is paid, in addition to his regular rate, for one-half time by which he may reduce the allotted schedule for any operation. To encourage the workmen in the suggestion of time reducing changes, the company assures him that no cut will be made in the



Fig. 10—Device for Suspending Lighting Wires from Steel Roof Members

original limit for the operation until the employee has been well paid for his improvement. The company also has in operation a savings system based upon subscriptions to Gisholt 4 per cent. notes in accordance with which the employee may regularly, or at intervals, request the company to withhold from his wages stated amounts for the purchase of these notes, payable on demand.

The shop also has its own relief association, known as the Fuller & Johnson Relief Association, which provides protection against sickness or injury at a very low rate. The Gisholt Club was organized in February, 1907, for the purpose of promoting fellowship among the men in the shop and to provide diversions of an educational or entertaining character. The company has no authority in the governing of the club and is simply a member, but provides facilities for the club functions. The club activities include athletic, dramatic and musical organizations under paid instructors. Entertainments given exclusively by club talent are frequent. The company feels that this welfare work has demonstrated its own value in preserving the shop organization intact and on a lower wage basis than has been offered the men elsewhere.

The company has erected a beautiful office building with an underground tunnel connection from the shop. The feature of special interest in the office is the use of indirect lighting in the drafting room. This system has been found exceedingly satisfactory as indicated in Fig. 6, through the use of sufficient candle power.

The U. S. Expansion Bolt Company is now occupying new offices and a spacious warehouse in the Hudson Terminal Building, New York City, with an entrance at 48 Dey street. The offices are attractively furnished, and a full line of the company's product is carried in stock. On the invitation of the company, of which Charles H. Mead is general manager, many visitors have inspected the offices and warehouse and commented favorably on the excellent facilities for conducting business.

## Blower Equipment of American Dreadnaughts

One of the factors which contributed materially to the high speeds made by the battleships Florida and Utah in their final acceptance trials is said to be the Sirocco blowers with which both vessels are equipped. Twenty-four blowers equipped for direct connected motors were designed and manufactured by the American Blower Company, Detroit, Mich., and twelve were installed in each of these battleships. Although the wheels of these blowers are only 33 in. in diameter, it is possible to secure a delivery of 28,500 cu. ft. of air per minute. When all of the units on a vessel are in operation at the one time the volume of air delivered to the boiler fires is 342,000 cu. ft. per minute or 768 tons of air per hour. The collective capacity of the fans used on each battleship can probably be expressed more comprehensively in terms of space than of weight and a clearer realization of the amount of air handled obtained when it is considered that 768 tons of air per hour means slightly more than would be contained in a tank 510 ft. high and having a base of 200 ft. square. Taking the usual amount of air required to burn one lb. of coal is approximately 18 lb. or 240 cu. ft., the full set of fans running on each vessel will furnish sufficient air to burn 43 tons of coal per hour. One of the special features of these blowers which adapt them particularly for this class of work is the small amount of space required to supply the necessary air blast.

Both of these vessels were designed for a speed of 20.75 knots. Like all the other vessels for the navy they went through a builder's trial and then through a Government trial before they were accepted. These trials were made under what might be called special conditions, the course, the crew and the officers being selected. After the vessels had been turned over to the Government and had gone into service, when they had their own officers and crews, were burning regular fuel and had become in every sense of the term regular vessels, they were put through another trial in which the conditions were those of actual service. Here there was no opportunity for any selection or specialization in connection with the course, officers, crew or fuel. During her standardization trial the Utah ran a measured mile at the rate of 21.92 knots and during the 4-hr. trials an average speed of 21.042 knots was maintained. The figures for the Florida in these two trials were 22.54 and 22.07 knots.

## The New Haven Permanent Exhibition

The New Haven Manufacturers' Permanent Exhibition, New Haven, Conn., was formally opened May 22. This exhibition has attracted such wide attention that immediately after its opening visitors from various parts of the country took advantage of the opportunity thus afforded of familiarizing themselves with the products of New Haven factories. It is expected that it will prove a great convenience to buyers from out of town who visit New Haven annually in making their purchases. On reaching the exhibition a buyer can see grouped together samples of products of various establishments and meet their salesmen. He can thus secure direct communication with factories making a wide variety of products at a great saving of time. A telephone directory room in the building has a collection of telephone directories of every city of importance in the country. Should the buyer desire to communicate with parties in other cities he can do so without leaving the building.

The exhibition is the outcome of a visit made two years ago to Germany by C. E. Julin and Frank G. Schollhorn. They saw such exhibits there, and on returning reported their observations to the New Haven Chamber of Commerce. Many new ideas were brought forth as the original project ripened and are now embodied in the exhibition. It is stated that the annual cost of up-keep will be about \$10,000. The association has secured a lease on the building in which the exhibit is located at an annual rental of \$5000. G. E. Osborne is in charge of exhibits. The capacity of the building is 90 floor spaces and 20 wall spaces. By a rule of the association exhibits must be from New Haven or suburban districts. The basement of the building may be used for exhibits of heavy machinery and products.

# Safeguards for Electric Cranes

Further Details of Safety Provisions and Operation in Plant of Illinois Steel Company Applicable to Industrial Establishments Generally

BY EDWARD K. HAMMOND

Experience has shown that the dangers connected with the operation of electric traveling cranes are far more numerous than a casual consideration would lead one to believe. Aside from such obvious sources of accidents as the dropping of a load or the possibility of a crane falling from the structure, there are many less conspicuous hazards that may produce serious accidents.

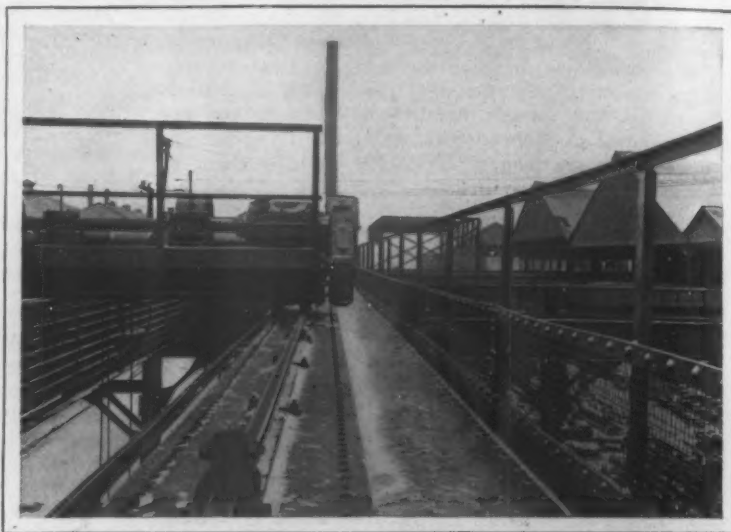
The Illinois Steel Company has made an exhaustive study of this subject, which study has been the means of exposing the dangers connected with the use of cranes in this company's plants, and, as each danger was brought to light, safeguards were developed. The extensive use of cranes in steel mills and fabricating shops makes the avoidance of dangers incident to their use a matter of vital importance, and as the safety devices and precautionary measures now used by the Illinois Steel Company are general in their application, some of them are presented in this article.

Most crane accidents may be traced, either directly or indirectly, to one of the following causes: Falling from the structure; being caught in the mechanism or shocked by electric conductors; being struck by a moving crane while working on the structure, or being hit by the load or by tools falling from the crane.

The most obvious step in preventing the danger of crane men's falling from the structure is to provide railed walks running the entire length of the bridge and also on the trolley. Where possible, railed walks are also provided on buildings running parallel with crane runways. Such walks do away with climbing on the structure, where a man runs the double risk of falling or being struck by a moving crane. The standard construction

would fall with the loosening of keys or breaking of supports are encased.

An important point in preventing injuries under a crane by falling tools and other material is an arrangement to keep such appliances in a safe place when not actually in use. Fixed boxes are provided on the crane



Protected Walks and Safety Bumper for Cranes

bridges for this purpose, as shown in one of the engravings, and a rule is made of clearing away all tools and materials which have been used in making repairs before starting the crane to work.

Hooks and cables of adequate strength are, necessarily, a matter of primary importance for safely handling heavy loads. The cables are subject to wear and they are one of the points which require particularly careful inspection. The cables may also be damaged through the strain they receive if a load is hoisted high enough to bring it into contact with the crane. This danger is eliminated through providing hoist-limit switches which act automatically to shut off the power when the load has been raised to a given point. In making the hoist hooks, the cross-sectional area may be made too small at some one point, thus making this section too weak to safely carry the required load. An accompanying drawing shows the hook design which has been adopted by the company, together with the specifications for hooks of different carrying capacities.

The care which is taken to insure having safe cables and hooks is supplemented by the use of a system of signals to prevent the crane man from starting up the hoist when the men below are not ready. Another important precautionary measure is observed in requiring the crane men to take the necessary time to bring the trolley

exactly over the load before starting the hoist. If the cable is at all inclined from the perpendicular the load will swing when it is raised from the ground, and may strike the hookers and other men who are working near it.

Stairs or fixed iron ladders leading to platforms are provided as the means of getting to the crane cab, as illustrated in an article by Robert J. Young, safety inspector Illinois Steel Company, in *The Iron Age* of January 4. The system of ladders and platform was developed to



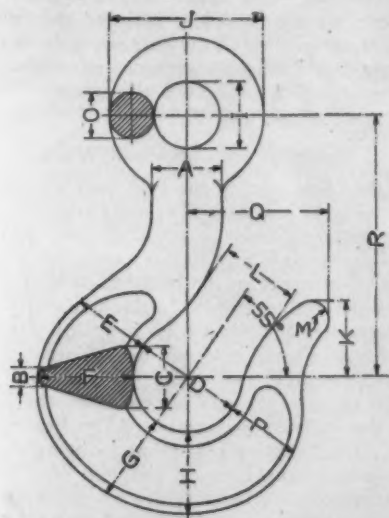
Protected Gears, Shaft Coupling and Switch for Cranes

adopted calls for railings of 2 x 2 x 1/4 in. angle iron, 3 ft. 6 in. in height. A toeboard 6 in. high is provided at the base of the railings to prevent tools and loose material from being kicked off the walks. Where there are gears hanging over a walk, the space between the toeboard and the center rail is filled in with heavy wire mesh, as shown in one of the pictures, the idea being to prevent the gears from falling in event of their working off the shafts. All other gears and parts of the trolley mechanism which



minimize the chances of a crane operator being shocked by the electric power rails while getting to his cab. As a further protection all trolley wires entering the crane cabs are required to be covered with a substantial insulating material. A heavy piece of angle iron is also placed under the power rails on the crane bridges, preventing the hoisting cable from forming a short circuit across them in case of a side pull. Where open type controllers are used accidents have been caused through the flash injuring the operator's eyes. This danger has been effectually guarded against by providing asbestos-lined steel guards over the movable contact parts on controllers of this type.

The usual methods have been adopted for guarding gearing, shaft couplings and other moving parts. The pictures show examples. To prevent accidents while men are working on or near the crane runways, the use of guards to announce the approach of a crane was illustrated in the issue of January 5. The guards are mounted on the trucks and extend 1 ft. 6 in. in front of the wheels. This length is such that guards on adjacent cranes working on the same runway do not interfere when the cranes bump, and space is provided in the stops at the end of all crane runways to allow for the guards. Eight-inch, five-row wire brushes or cast steel guards are used, clearing the rails by  $\frac{1}{4}$  in. The new steel guards are made with a rib on the side so that if there is nothing else for the man to catch hold of when his hand is shoved to one side, he will naturally cling to this rib. Where two or more cranes are working on the same runway, temporary stops are used for isolating any crane while it is shut down for repairs. Steel castings are used for the stops and a red signal lamp is also used on a crane when it is down for repairs, the lamp being mounted in a position which makes it easily seen from all approaching cranes.



Design of Hoisting Hooks

Dimensions, Expressed in Inches, in Following Table

| Tons | 1  | 1½ | 2  | 3  | 4  | 5  | 6  | 8  | 10  |
|------|----|----|----|----|----|----|----|----|-----|
| A    | 1½ | 1½ | 1½ | 1½ | 2  | 2½ | 2½ | 2½ | 3½  |
| B    | 1½ | 1½ | 1½ | 1½ | 2  | 2½ | 2½ | 2½ | 3½  |
| C    | 1½ | 1½ | 1½ | 1½ | 2  | 2½ | 2½ | 2½ | 3½  |
| D    | 1½ | 2  | 2½ | 2½ | 3½ | 3½ | 4½ | 5½ | 6½  |
| E    | 1½ | 1½ | 1½ | 1½ | 2½ | 2½ | 2½ | 3½ | 4   |
| F    | 1½ | 1½ | 1½ | 2½ | 2½ | 3  | 3½ | 3½ | 4½  |
| G    | 1½ | 1½ | 1½ | 2½ | 2½ | 2½ | 3  | 3½ | 3½  |
| H    | 1½ | 1½ | 1½ | 2  | 2½ | 2½ | 2½ | 3½ | 3½  |
| I    | 1½ | 1½ | 1½ | 1½ | 1½ | 2  | 2½ | 3½ | 3½  |
| J    | 2½ | 3½ | 3½ | 4½ | 4½ | 5½ | 6½ | 7½ | 8½  |
| K    | 1½ | 1½ | 1½ | 1½ | 2½ | 2½ | 2½ | 3½ | 4½  |
| L    | 1½ | 1½ | 1½ | 2  | 2½ | 2½ | 3½ | 3½ | 4½  |
| M    | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ | 2½ | 2½  |
| O    | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ | 2½ | 2½  |
| P    | 1½ | 1½ | 1½ | 1½ | 2½ | 2½ | 2½ | 3½ | 3½  |
| Q    | 2½ | 2½ | 2½ | 3½ | 4½ | 4½ | 5½ | 6½ | 8   |
| R    | 4  | 4½ | 5½ | 6½ | 7½ | 8  | 9½ | 11 | 13½ |

Safety switches are placed on all crane bridges, as also here shown, to shut off power. Whenever it is necessary to go on top of a crane the safety switch is pulled and a warning notice is placed on it, stating that the crane is shut down for repairs. This method is to preclude the possibility of men being injured through having a crane accidentally started while a repair man is working on the mechanism. The crane runways are equipped with bumpers, which engage with bumpers on the cranes to take up the shock. The bumpers on one crane also engage with those of the adjacent cranes on the same runway. The customary use of gongs to warn men working in the shops of the approach of the load is supplemented by having the hookers walk ahead of the load to warn workmen to get out of the way. To secure the maximum control, all cranes are provided with load, motor and foot brakes. The plungers and weights of these brakes are encased so that it is impossible for them to fall if the supports were to break.

Each crane operator serves through an 8-hr. shift, and after each period he makes a complete inspection of the crane before being relieved by the next man on duty. The results of this inspection are reported on the form, which gives spaces for noting the condition of both the main hoist and the auxiliary hoist. The scope of the inspection is shown by an "Instruction" blank, with a copy of which the operator is presented. A copy of the blank is here reprinted. Before being placed on duty as a crane operator the man is fully trained concerning the dangers connected with the work, and he is also required to become familiar with the "Rules to Electric Cranemen," which are printed on an 8 x 10½-in. card. Enameled signs also bearing these rules are mounted in a conspicuous place in every crane cab so that the importance of observing all safety measures is kept constantly before the attention of the cranimen. These rules are as follows:

## Electric Crane Report

In making out reports of crane conditions, cranimen will please note carefully any necessary repairs to the following parts (including all apparatus used in connection therewith):

|                             |               |
|-----------------------------|---------------|
| Auxiliary Hoist Brakes      | Platforms     |
| Main Hoist Brakes           | Cages         |
| Main Hoist Cables           | Trolleys      |
| Auxiliary Hoist Cables      | Gears         |
| Cable Pulleys               | Collectors    |
| All Bearings and Bolts      | Controllers   |
| Limit Switches              | Motors        |
| Safety Switches             | Ladders       |
| Bridge Wheels               | Wheel Buffers |
| Shieve Wheels               | Foot Brakes   |
| Safety Guards, such as:—    |               |
| Gear Covers,                |               |
| Sign, "Do Not Move"         |               |
| Sign "Rules to Cranimen"    |               |
| Guards front of Truck Wheel |               |

If crane was in collision make report of the fact on this blank, giving result of collision and repairs necessary on this account.  
[This is signed by the general superintendent.]

## Rules to Electric Cranimen

1. Never leave crane cage without opening main switch.
2. Never go on top of crane or permit any one else to do so without opening main switch in cage and safety switch on top of crane, and put a warning sign bearing your name on safety switch.
3. Whenever safety switch is found open, do not close same until you are absolutely sure that no one is on crane or crane runway. Examine trolley carefully.
4. Keep crane clean, well oiled and in good working order, using the tools you have for this purpose.
5. Report to repairman any needed repairs which you cannot handle.
6. When crane is down for repairs, assist repairman. After completion of any job, make sure that bolts, tools, etc., have been removed so that no damage to machinery will result when crane is operated, and so that nothing can fall off crane.
7. Where there is more than one crane operating on a runway, each crane shall be provided with temporary stops, to be attached to the rails for the purpose of isolating a crane while repairs are being made on same.
8. Under no consideration permit your crane to bump into another crane until you are positive that no one on the other crane is in a position to be injured. Orders from anyone to the contrary are to be disregarded.
9. Do not allow men to ride on load carried by crane, or on crane hooks. Refuse to move.
10. Do not move load without signal from proper man.
11. Before starting to hoist place the trolley directly over the load to avoid swinging the load against workmen.
12. Hookers must walk ahead of loads carried by cranes, and warn men on the floor to get out of the way of the load.
13. Cranimen must not use controller to supply heat for cage.
14. Remain on duty until relief appears, unless excused by proper foreman.
15. Remain in crane cage ready for duty.
16. Examine your crane every turn for loose or dangerous gears, keys, ladders, runways, railings, warning bells, signs, switches, sweepbrushes, cables, brakes, etc., and make a written report on the form provided when you go off duty, showing the condition in which you leave your crane. Do not fail to report anything that is out of order. It may save someone's life.



## Blowholes in Steel Ingots\*

### Investigation Showing the Welding of Cavities in Crucible Steel

BY J. E. STEAD

Experiments with a honeycombed ingot of 0.5 per cent. carbon crucible steel were made at the works of J. H. Andrew & Co., Ltd., with the assistance of the manager, J. L. Potts, and his melter, Mr. Duckenfield. Two steel ingots from the same mixture were melted in such a way that one was honeycombed and the other sound. The honeycombed steel rose to nearly 10 per cent. of its length after teeming, whilst the sound ingot did not rise, but contracted down its central axis.

We may assume that about 9 per cent. of the volume of the honeycombed ingot was occupied by blowhole cavities. The ingots were forged to a smaller size after heating to a wash welding temperature, estimated at not less than about 1100 deg. C., sufficient to melt the scale on the surface, and were divided into two parts. Half of each set of bars were reheated to 1100 deg. C. for one hour, and were then rolled to bars 1 in. in diameter. The remaining halves were heated in the usual way without soaking, and were also forged to 1 in. round bars. All the bars were "reeled" after forging. Portions of each of them were turned down to prisms of  $\frac{3}{8}$  in.,  $\frac{5}{8}$  in.,  $\frac{3}{4}$  in. and  $\frac{1}{2}$  in., and through each a hole was drilled, so as to make a series of cylinders with walls  $\frac{3}{16}$  in. in thickness. A similar hole was drilled through portions of the bars which had not been reduced in diameter by turning. The cylinders thus prepared were cut up into a series of rings about  $\frac{1}{4}$  in. in depth.

The object of making these rings was to determine the degree to which they could be expanded before breaking, and to see if at their outer polished surfaces they would open out into seams on being slightly strained. The outer parts of the rings were brightly polished, and the rings were expanded by driving into them a hard taper steel drift.

#### Experiments Comparing Sound and Honeycombed Ingots

The results need not be given in detail. It is sufficient to state that in no single ring after slight expansion was any unwelded steel detected, and in every case when fracture was effected the steel on each side of the parting showed evidence of contraction or plastic flow. We may conclude, therefore, that the surfaces of the rings were as sound in the steel from the bars of the honeycombed as they were in the steel from the sound ingot, and as there was no difference between the bars with and without soaking, we may be certain that soaking after wash welding, in this case at least, was of no advantage, because the forging in the first instance produced as perfect welding as was possible, and no soaking afterward could improve what was perfection. Although the welding up of the blowholes was apparently good, there was, however, a great difference in the physical properties of the rings from the respective ingots.

The rings from the sound ingot expanded on the average about 50 per cent. more before breaking than those from the honeycombed ingot, a peculiarity suggesting at



Fig. 1—Section through closed-up oxidized cavity. Black part represents cinder; white part, metal.

Fig. 2—Same as Fig. 1 after heating for 3 hr. at 950 deg. C. Dark parts are actual spaces and unreduced slag inclusions.

Fig. 3—Same as Fig. 2 after heating for 1 hr. at 1100 deg. C. Dark parts are actual spaces and unreduced slag inclusions.

Fig. 4—Same as Fig. 3 after heating to 1100 deg. C. and forging down to smaller size. Dark parts are slag inclusions.

first sight imperfect welding of the blowhole walls. A careful examination of the fractures revealed the presence of dull lines of microscopic fineness in the rings from the

honeycombed ingot, while nothing of the kind could be detected in the steel from the sound ingot.

Further, on bending the broken rings from the honeycombed ingot, it was found that some portions of them could be bent to a greater extent without breaking than others, while there was not such variation in the steel from the sound ingot. In the cases where fracture occurred on slight bending these dull lines could almost always be detected on the broken surfaces, but none were present in the portions of the same rings which could be bent to a much greater degree before fracturing. Obviously these dull lines and reduced ability of the steel to extend were co-related.

#### Segregation of Manganese Sulphide

As the steel contained only 0.02 and 0.03 per cent. of sulphur respectively, it seemed improbable with such a small amount of sulphur that there could be any material segregation of manganese sulphide in the blowholes. To determine whether there was or not, cross-sections of the inch bars from the sound and honeycombed steels were cut and polished, and auto-sulphur prints were obtained on bromide paper. The results showed that the sulphur was distributed evenly in the bar from the sound ingot, but was segregated in the places where there had been honeycombs in the unsound ingot. Sulphur prints taken from a cut section of the honeycombed ingot itself also proved that the cavities contained sulphides. We may, I think, be satisfied in concluding that the dull lines are co-related in some way with the sulphide segregation. Finally, sulphur prints of the fractures proved that the dull lines were rich in sulphides.

That clean faces of cavities in crucible steel can be perfectly welded together under treatment identical to that to which the honeycombed ingot was subjected has been fully proved; we are therefore satisfied that the inferior ductility in cross-sections of the bars made from the honeycombed ingot was due to the presence of sulphide of manganese threads which prevented the metallic faces from completely coming into contact.

#### Blowholes with Oxidized Walls

During the latter part of the year 1911 a series of trials was made, with the assistance of Mr. Parkin, to determine whether or not artificially formed cavities with oxidized walls could be welded up. It was taken for granted that if no carbon were present in the steel, oxidized blowholes could not be perfectly welded. In the first experiment with a 2-in. square steel bar about 8 in. in length containing 1.2 per cent. carbon, a small hole was drilled nearly to the bottom, along the central axis. The bar was then heated to redness and oxygen gas was blown down the hole, so as to oxidize the walls of the cavity. After heating to about 900 deg. C. it was hammered, so as to bring the sides of the cavity into juxtaposition. The bar was then heated to and maintained at a temperature of about 1100 deg. C. for one hour, and was at once forged down to a smaller size. When cold it was nicked at intervals and broken at the nicks, and the fractures examined. They indicated imperfect welding near to what was originally the open end of the bar, but below this for two-thirds of the length the welding appeared to be perfect.

On microscopic examination of the polished cross-sections of the parts where welding appeared to be good it was found that the seam, originally consisting of oxide of iron, had been practically reduced to the metallic state, with the exception of minute globular dust-like inclusions, probably of iron or manganese silicate—the residue of the oxidized steel which was incapable of being reduced by the carbon. But for these excessively minute inclusions the welding was perfect. On bending a polished and etched section to open the joint, the metal at this point being lower in carbon than the surrounding mass, extended and then broke, showing a perfectly crystalline fracture, a proof that good welding had been effected.

#### Effect of Soaking and Forging

In a second experiment with the same steel a bar was prepared as above described, with the exception that after the cavity was oxidized and closed the bar was heated to 950 deg. C. for three hours. It was then cut in half; one-half was retained for examination, the other was reheated at 1100 deg. C. for one hour, and without forging, it was allowed to cool. It was again cut into two portions, one of

\*From a paper read before the Iron and Steel Institute, London.

which was heated to 1100 deg. C. and then forged down to a smaller size. The other part was reserved for examination. Each of the three specimens was sectioned, polished and examined microscopically without etching.

Figs. 1 and 2, representing magnifications of 330 diameters, show that by heating at 950 deg. C. the carbon of the steel reduced the iron scale to metallic iron, which remained in separate grains, surrounded either by some slight amount of unreduced oxide, or gaseous spaces, or by both.

On attempting to bend the specimens, the grains at once separated; there was no cohesion, they had not completely crystallized together—a result not surprising, for the volume of metallic iron is less than that of its oxide.

Fig. 3 represents the same bar as the last after heating to 1100 deg. C. for one hour. The drawing shows that the greater mass of the reduced iron grains had crystallized together and pressed to one side the intervening gases, and compelled them to segregate into relatively large bubbles at a considerable distance from each other. The micro-structure of the joint in the third portion, which had been reheated to and forged from 1100 deg. C., was identical with that in the bar of the first experiment, which had been heated to 1100 deg. C. for one hour and then forged to a smaller size, and is represented in Fig. 4. The welding was perfect, with the exception of the minute globular inclusions previously referred to.

In a third experiment the steel bar was treated exactly as in the first, but the bar itself contained only 0.50 per cent. carbon. The welding was found to be complete, but the joint previously occupied by the scale now consisted of carbonless ferrite, and the adjacent steel contained less carbon than the mass of the steel itself. These results show, as was anticipated, that if the walls of the cavities are not too thickly scaled and a sufficient quantity of carbon is in the steel, the scale itself can be reduced practically entirely to the metallic state, and this can be welded up to the sides of what was originally the cavity.

#### Signs of Blowholes in an Axle

It is generally assumed that blowholes, which terminate on one side through the outer skin of the envelope of steel ingots, having access to oxidizing gases, get so severely oxidized on their walls that no welding of the cell walls occurs, and that in rolling out they are simply extended and appear at the surface of the rolled sections as rokes, which penetrate to the full depth of the extended blowholes.

It is only necessary to describe a single instance. This was a railway axle, on the surface of which there was ample evidence of pre-existing cutaneous blowholes in the ingot, for at intervals there were longitudinal lines or fine grooves an inch or more in length. A cross-section vertical to the surface, after polishing, was sufficient to reveal the position and depth of these rokes. The depth varied

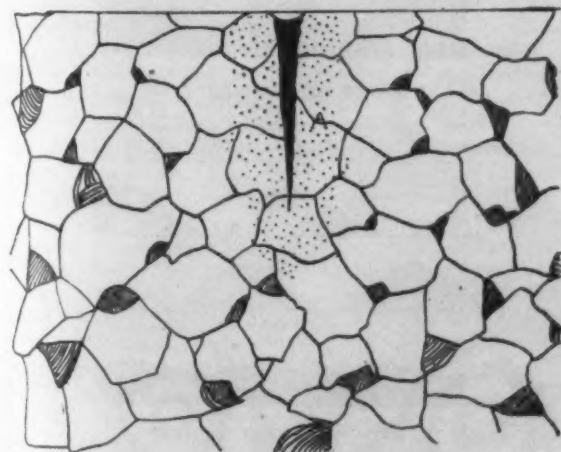


Fig. 5—Diagrammatic Sketch Showing Section of a Roke in a Steel Axle with Surrounding of Reduced Scale

from one-hundredth to one-fifth of an inch. The outer envelope was completely decarburized, as is usual in low and medium carbon steels which have been reheated in an oxidising atmosphere previous to forging or rolling.

There was a complete absence of the minute inclusions in this envelope; the steel contained no carbon, but the ferrite immediately in contact with the scale, and for a little distance beyond, contained minute globular inclusions, while at a greater distance the crystals of iron contained none.

The diagrammatic sketch, Fig. 5, explains better than words the appearance under the microscope. There can be little doubt that the ferrite containing the inclusions surrounding the remaining unreduced oxide was at one time oxide or scale in a blowhole, that this was reduced practically entirely to the metallic state by the carbon in the adjacent steel, and that the particles of reduced iron had crystallized together and to the steel itself, producing a practically perfect weld—indeed, on straining, so as to bend the steel, there was no opening out at the junction of the two zones. The minute inclusions are the residual portion of the scale which could not be reduced by carbon or carbon monoxide at the temperature at which the steel had been heated and rolled.

#### Conclusion

In conclusion, it seems reasonable to believe that under the ordinary treatment to which honeycombed ingots of steel are heated and rolled, internal small cavities or blowholes do become perfectly welded up, provided there is an absence of sulphide segregations, and that even when these segregations are present, as they are not in continuous lines but occur only at intervals, the clean metallic faces between them come into contact and weld together.

It seems also justifiable to conclude that surface blowholes which become oxidized on their walls during the heating and rolling of the ingot, do become more or less completely welded. The conditions favorable to this welding must be sufficiently high temperature, and maintenance of the steel at that temperature for a long enough period after the cavities have been closed, to admit of the carbon in the adjacent steel being afforded the opportunity to reduce the oxide scale.

#### Performance of Electric Motor Trucks

Some figures comparing the horse-drawn and the electric motor vehicle were recently selected from records of a prominent industrial concern by the Wm. D. McJunkin Advertising Agency, Chicago. They are here presented in tabular form and show a considerable reduction in cost per mile traveled and per ton carried per mile for the electric compared with the horse vehicle, with the greater showing apparently for the smaller-sized trucks. In emphasizing the advantage of the electric vehicle, mention is made of the small number of working parts in an electric machine as compared with other forms of automobile, and this fact is regarded as unquestionably resulting in low repair cost and similarly in high durability. The operation of an electric truck is, of course, simple, and it is generally understood that the insurance rates are low because of the minimum chance of fire. It is claimed that few business men attach sufficient importance to the low cost of power for operating an electric truck.

|                | Miles per day | Ton miles per day | Cost per day | Cost per mile | Cost per ton-mile |
|----------------|---------------|-------------------|--------------|---------------|-------------------|
| 1-Ton Trucks   |               |                   |              |               |                   |
| Horse .....    | 17            | 17                | \$7.13       | \$0.419       | \$0.419           |
| Electric ..... | 35            | 35                | 6.89         | 0.20          | 0.20              |
| 2-Ton Trucks   |               |                   |              |               |                   |
| Horse .....    | 16            | 32                | 8.37         | 0.261         | 0.261             |
| Electric ..... | 30            | 60                | 7.99         | 0.27          | 0.135             |
| 3½-Ton Trucks  |               |                   |              |               |                   |
| Horse .....    | 13            | 52                | 8.41         | 0.56          | 0.162             |
| Electric ..... | 27            | 94                | 9.57         | 0.35          | 0.10              |

The continued growth of the business of the Lagonda Mfg. Company, Springfield, Ohio, has made the erection of a new three-story reinforced concrete office building necessary. The present office was located in one end of the factory building, but greater factory and office facilities were needed. Although an addition was made to the factory not very long ago, the business of the company has increased so rapidly that delays have occurred in filling orders, which will be eliminated by the construction of this new building.

The Worcester Pressed Steel Company, Worcester, Mass., has made up to date 1,000,000 pressed steel wrench sockets.



## Five-Cylinder Engines for Reversing Mills

### Analysis of Their Advantages and Also of Considerably Increasing Steam Pressure

\* An interesting presentation of the advantages of using five simple engines for driving a reversing mill, with the cranks spaced at an angle of  $72^\circ$ , was made by John W. Hall, Birmingham, England, in a paper read before the May meeting in London of the Iron and Steel Institute. The author dealt with the severe duty demanded of the steam engine working a reversible mill, taking into account the high momentary power requirements and the necessity of bringing to rest and starting in a reverse direction heavy masses of metal. He discussed briefly the limitations to operating the reversing-mill engine condensing, and the use

at high speeds this sets up a large unbalanced force tending to move the engine as a whole upon its foundations, which must be massive to absorb the vibration. With three cranks spaced equally there is no such unbalanced force tending to move the engine as a whole. True, both these defects of the two-cylinder engine can be counteracted by balance weights, but as these add considerably to the revolving weights, they make the engine more sluggish in starting and less prompt in stopping.

From every point of view, then, the three-cylinder engine is superior to the two-cylinder, and its very general adoption of recent years is not therefore surprising. Reversing engines, which are none too large to start quickly, all have such an excess of power when at full speed that, though the valve gear is linked up, the engines run away unless the steam is throttled down from boiler pressure, involving considerable loss by "wire drawing."

On considering the defects of existing reversing engines it occurred to the writer that by still further multiplying the number of cylinders and reducing their capacity, the starting effort could be increased and the full boiler pressure utilized much later in the run, with a saving of steam both at commencement and finish. Another of the cuts shows the working of an engine having five  $36 \times 36$ -in. cylinders, the combined capacity of which is 44 per cent. less than that of three cylinders 48 in. diameter by 60 in. stroke, and 15 per cent. less than that of the two-cylinder engine of that size. Yet the minimum starting effort of the five-cylinder engine is 42 per cent. greater than that of the three, and 37 per cent. greater than that of the two-cylinder engines with larger cylinders.

But apart from the saving in steam which this would effect, the shorter stroke of the five-cylinder engine would

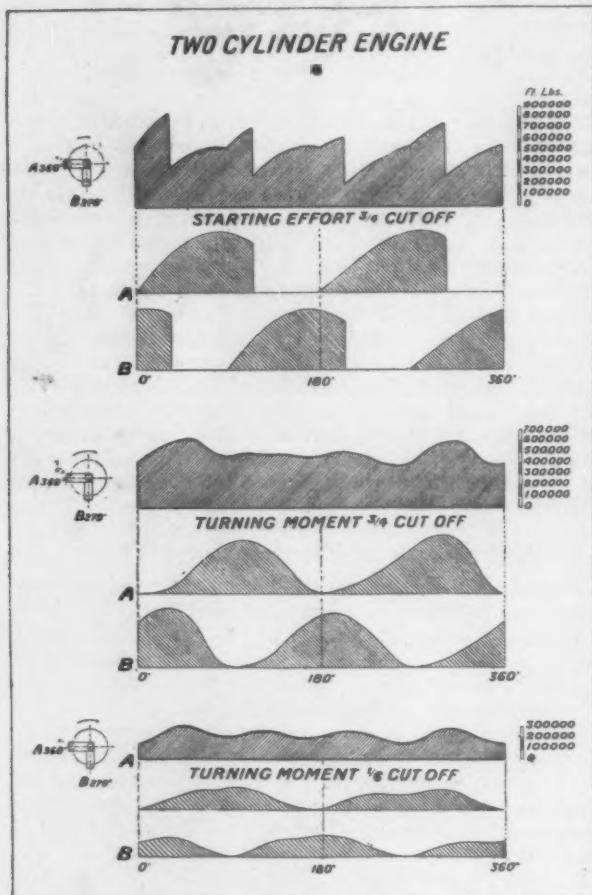


Fig. 1—Energy Diagrams of Two-Cylinder Engine

of compound engines, steam turbines and an engine having two cranks set  $90^\circ$  apart. What he had to say of engines with three and more cylinders was as follows:

An accompanying cut shows that if a third cylinder be added to an engine and the cranks are spaced at an angle of  $120^\circ$  apart, the valves may then be set to limit the admission to half stroke, and yet there will be an effort of 190,000 ft. lb. available for starting the engine. The saving in steam due to limiting the maximum cut off to half instead of to three-quarters of the stroke, as in the case of a two-cylinder engine, will be about 30 per cent. at the latest cut off, when the consumption of steam is highest.

The turning moment of the three-cylinder engine when running is also much improved. At high speeds, when shocks are most detrimental, the variation between the maximum and the minimum turning efforts is as 2.2 is to 1 in the two-cylinder, but only as 1.5 is to 1 in the three-cylinder type. The running at slow speeds is also better, because the weights of the three cranks balance each other in any position, and there is none of that tendency to "hang" displayed by two-cylinder engines when both cranks come to the bottom.

With two cranks at right angles the center of gravity of the cranks, pins and connecting rods is situated at a considerable distance outside the axis of the crankshaft;

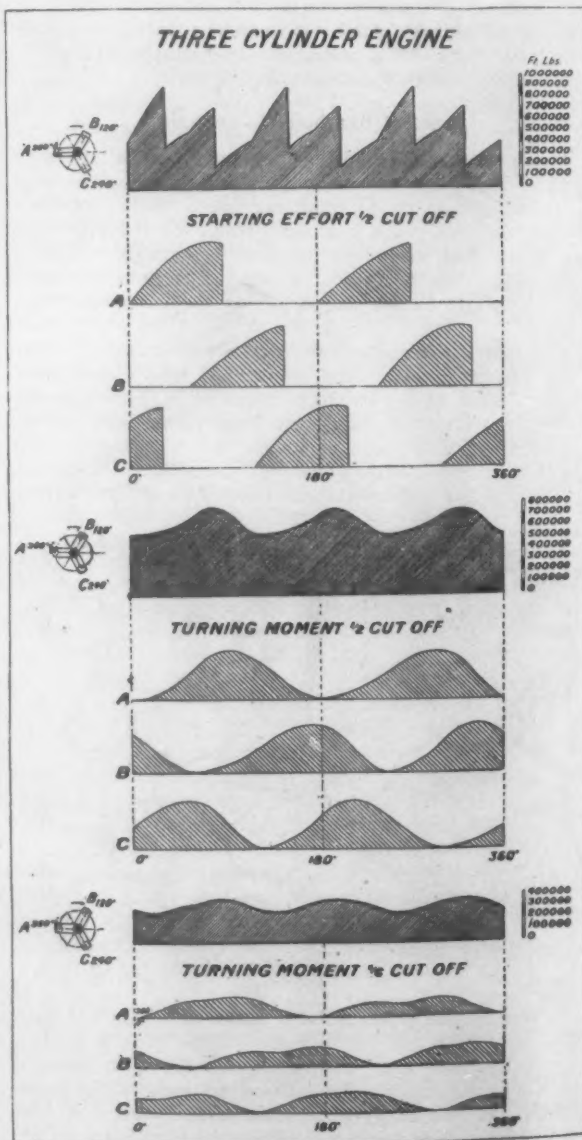


Fig. 2—Energy Diagrams of Three-Cylinder Engine



permit of its being run at 200 r.p.m. without exceeding the piston speed of the larger engines, running at 120 r.p.m., so enabling a larger output to be obtained from the mill. Also the turning moment obtained from the five-cylinder engine, as shown, is so nearly constant that the maximum stress on the crankshaft, the spindles and rolls is 25 per cent. less than with the two-cylinder and 29 per cent. lower than with the three-cylinder engines.

The cranks also balance each other against gravity in any position, just as in the case of a three-cylinder engine; so that there are no unbalanced forces tending to move the engine as a whole on its foundations, and the local unbalanced force may be materially reduced. By placing the two adjoining cranks, not at 72 deg. apart but at 144 deg., the weights concentrated at the crank pins go a long way towards balancing each other, the disturbing couple being situated at a distance of only 5.56 in. from the center of the crankshaft, whereas in the three-cylinder engine the couple tending to shake the bearing between the two cranks will be situated at 15 in. from the axis of the shaft; and as the centrifugal force is proportional to the square of the speed, the disturbing force, at the same number of revolutions, with the five-cylinder engine will be as 31 is to 225 in the case of the three-cylinder engine—only about one-seventh as great—supposing the weights for both engines were alike, whereas the connecting rods of the five-cylinder would be appreciably lighter.

In addition to these advantages, the first cost of five engines with cylinders of 36 in. diameter by 3 ft. stroke would not be more than about three-fourths of that of three engines having cylinders of 48 in. diameter by 5-ft. stroke. The cost of the spare parts to be kept in stock in case of a breakdown would also be reduced by about one-half; and if the five sections of the crankshaft were made all precisely alike, as could be easily arranged, only one-fifth of a crankshaft would be needed to insure immunity against having to wait while a new crankshaft was being made to replace a broken one. Indeed, there would probably be very little difficulty in running with four cylinders only for some considerable period if desired.

The most marked advantage, however, would be in the case of a plant containing blooming, roughing and finishing mills. In this case the keeping in stock of a complete spare engine, even down to the cylinder and bed plate to renew any one broken, would only add one-fifteenth to the whole cost of the three sets of engines, and by making the parts interchangeable a damaged engine could be literally lifted out and a new one dropped in its place without stopping the plant for more than a few days.

There is one further point to deal with, namely, the steam pressure. The higher the pressure against which the engine exhausts the more efficient is the cushion. There seems no reason why the common pressure of 120 lb. should not be materially increased. The writer has had several engines, for the design of which he is responsible, working for some years now with steam of 200 lb. pressure superheated 150 deg. F., and has experienced no trouble whatever with them. Pressures of 250 and 265 lb. have long been common in the Navy; and there seems no reason whatever why steam of 300 lb. pressure, superheated 150 deg. F., up to which temperature no difficulties arise, should not be regularly used in reversing engines.

Consider the case of blast furnaces consuming 50 tons of coke per hour and yielding 140,000 cu. ft. of gas per ton of coke; the gas given would be 7,000,000 cu. ft. Allowing 45 per cent. of this for heating the stoves, there would remain for producing power 3,850,000 cu. ft. of gas per hour. Employing this gas to raise steam at 300 lb. pressure, superheated 150 deg. F. in boilers capable of evaporating 50 lb. of water per 1000 ft. of gas, there would be available 192,500 lb. of steam per hour.

This steam taken direct to reversing engines in the mill, requiring 30 lb. of steam per indicated horse-power when exhausting against a pressure of 80 lb. per square inch, would afford a continuous output of 6416 i.h.p. hr. Allowing that this exhaust steam would lose 15 per cent. in weight by condensation, etc., and drop 5 lb. in pressure, there would be left 163,625 lb. of steam at 75 lb. pressure to supply blast. Engines worked by this steam, which would yield 1 i.h.p. for every 31 lb. of steam when discharging at a little above atmospheric pressure, would provide 5278 i.h.p. for blowing the blast-furnaces. The blast required would be about 4,875,000 cu. ft. per hour, or 81,250

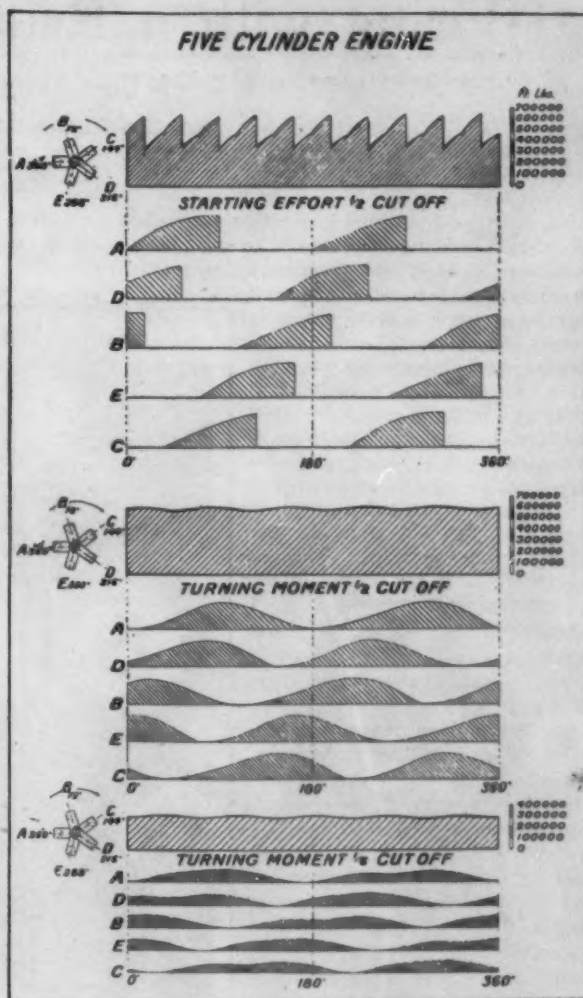


Fig. 3—Energy Diagrams of Five-Cylinder Engine

cu. ft. of free air per minute, to compress which to 8 lb. pressure per square inch would require about 32½ net i.h.p. per 100 cu. ft., or 2641 i.h.p. Blowing engines having a mechanical efficiency of 85 per cent. and a volumetric efficiency of 90 per cent. (giving an over all efficiency of 76½ per cent.) would absorb in this work 3452 i.h.p., leaving a margin of 1826 i.h.p. to meet contingencies.

Deducting 5 per cent. leaves 155,444 lb. of exhaust steam from these engines, which would produce, in an exhaust turbine capable of generating 1 e.h.p. for 30 lb. of steam, 5181 e.h.p. for the supply of current for the various purposes for which power is required about a works.

Seeing there would be only one set of boilers and one set of condensing units for the three departments—the blast-furnaces, rolling-mills and general electric supply—while all the engines would be of simple pattern, the first cost of such plant would be extremely moderate and the working costs very low.

It may be interesting to compare this proposed method of working with that of doing the same work by gas-engines, taking 1000 cu. ft. of gas to produce 11½ i.h.p. The gas-blowing engines, to be capable of producing the same power as before, namely, 5278 i.h.p., would require 458,956 cu. ft. of gas; to provide electric current equal to 5181 hp. would require 7200 i.h.p., consuming 626,087 cu. ft. of gas; and taking the over all efficiency of an ligner set at full load at 60 per cent., or say 55 per cent. average, there would be required 11,665 i.h.p. to drive the mills, consuming a further 1,014,434 ft. of gas, making in all a total of 2,099,479 cu. ft. This would leave a surplus of 1,750,521 ft. of gas available for some other purpose. Against this, however, would have to be set the interest, depreciation and wear and tear of the gas cleaning and electric plant and gas engines, and the higher amount of wages necessary to clean, work and tend them. Which of the two systems would, on the whole, be the cheaper to run would depend upon the price obtainable for the surplus power.

# Boring with a Radial Drilling Machine

A New Use of the American 6-Ft. Type as a Substitute for the Standard Horizontal Boring Machine, Resulting in Marked Saving in the Time of Production

A new and somewhat interesting application of its 6-ft. plain radial drilling machine has recently been made by the American Tool Works Company, Cincinnati, Ohio. This machine has been improved and developed until now it not only serves the purpose of a radial drilling and tapping machine, but also does service as a boring machine as well. Tests have been made with the drilling machine in comparison with a horizontal boring machine on the same classes of work and marked savings in time have resulted from the use of the former machine. Two applications of it are shown in the accompanying engravings, Fig. 1 illustrating the boring of lathe aprons, while Fig. 2 shows quick change gear boxes being operated on.

In Fig. 1 an apron for the builder's 24-in. high duty lathe, which was illustrated in *The Iron Age*, June 1, 1911, is being bored. Formerly this work was done on a horizontal boring machine in lots of 12, the time required being 72 hr. When the 6-ft. radial drilling machine was substituted together with a special jig the same amount of work was accomplished in 24 hr., a saving of 48 hr., or 66 2/3 per cent. Probably the maximum saving effected was on the work illustrated in Fig. 2, which is the boring of the quick change gear boxes for the 16-in. American high duty lathe. Formerly they were bored on a horizontal boring machine, the time consumed in this operation being 216 hr. for 36 pieces. These parts are now bored on a 6-ft. radial drilling machine by a jig, and the time was reduced to 45 hr. for 36 pieces, a saving of 171 hr. being effected on this particular job alone.

In making the results of these tests public, the company states that it is not in any sense trying to discredit the advantages claimed for the horizontal boring machine, and

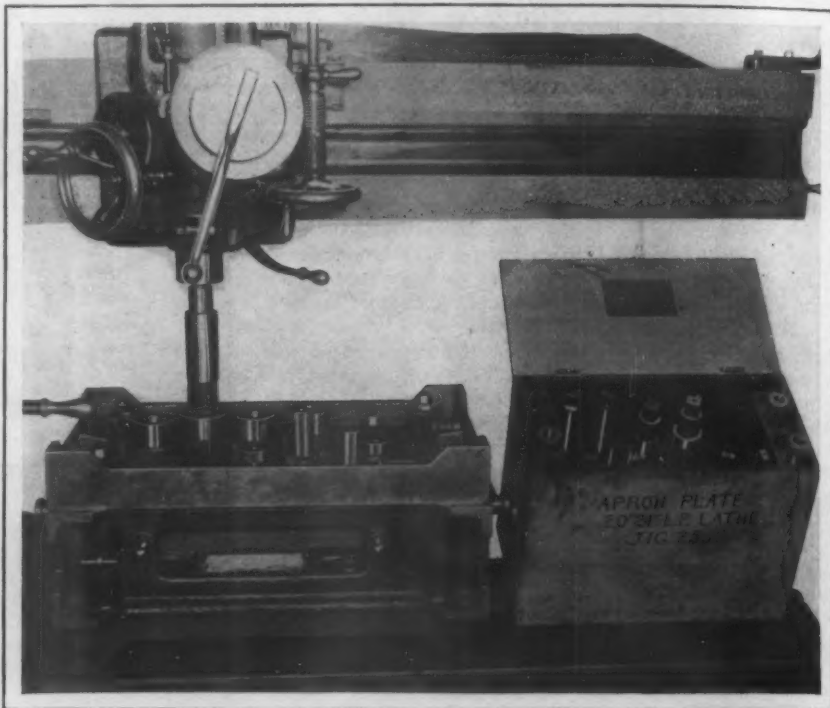


Fig. 1—Boring the Aprons for Lathes on the 6-Ft. Plain Radial Drilling Machine Built by the American Tool Works Company, Cincinnati, Ohio

while there are many classes of work which can be handled satisfactorily only on a machine of this type, there are likewise numerous operations that can be more advantageously performed on a radial drilling machine.

The Standard Oil Company has placed another order with the American Shipbuilding Company, Cleveland, Ohio, this one calling for two steamers and two barges. The boats will be of the Welland Canal size and will be built on the Isherwood system. The general dimensions of the vessels will be the same—260 ft. over all, 43 ft. beam and 23 ft. deep. The steamers will have a capacity of 800,000 gal. and the barges will carry 1,000,000 gal. They will be built at the Cleveland and Lorain yards. This contract makes six boats for 1913 delivery for which the Standard Oil Company has placed orders with the American Shipbuilding Company within a week.

G. C. Reiter, manufacturer of hardware specialties, Canton, Ohio, is building up an excellent trade in supplying his rotary multiple ringing foot gong for use on traveling cranes. There are no springs in the attachment, and it is easily fastened to the carriage of the crane. It will give, if desired, 30 rings with one push of the foot pin. The La Belle Iron Works, Steubenville, Ohio, has 24 in use on cranes in its plant, while the Carnegie Steel Company has 48 on cranes at its Duquesne works, Duquesne, Pa. The gongs are made in diameters of 10, 12 and 14 in., and in various finishes.

The Portsmouth Machine & Casting Company's plant at Portsmouth, Ohio, including foundry, machine, pattern and forge shops, all real estate and buildings, as well as the personal property, has been purchased by L. C. Turley, Portsmouth.

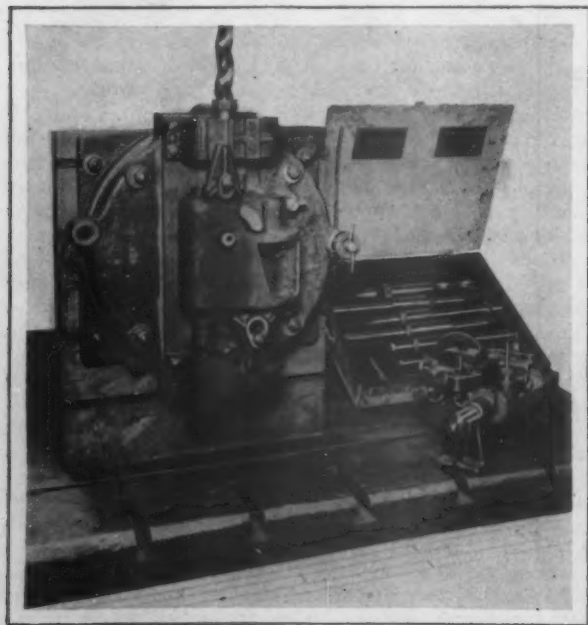


Fig. 2—Saving 171 Hr. in the Boring of Quick Change Gear Boxes for Lathes by the Substitution of a Radial Drilling Machine for a Horizontal Boring Machine



## The National Association of Manufacturers

The National Association of Manufacturers concluded its seventeenth annual convention at the Waldorf-Astoria, New York, on Wednesday, May 22. The proceedings of the first two days were briefly reported in last week's issue of *The Iron Age*.

At the session on Wednesday the convention adopted resolutions protesting against the movement for the recall of judges and strongly denouncing the passage of the Clayton anti-injunction bill and the Dillingham bill providing an educational test for all incoming aliens. The bill recently passed in the House of Representatives providing trial by jury in contempt cases was also protested against in a strong telegram to Senator Elihu Root. The campaign for the open shop was heartily indorsed. Another resolution requests the Post Office Department to make "a more equitable" rate as between postage on first and second class matter.

John Kirby, Jr., of Dayton, Ohio, was re-elected president; A. B. See, of New York City, was elected treasurer. The following board of directors was elected: J. G. Battelle, Columbus Iron & Steel Company, Columbus, Ohio; C. S. Brantingham, Emerson-Brantingham Company, Rockford, Ill.; H. S. Chamberlain, Citico Furnace Company, Chattanooga, Tenn.; Geo. T. Coppens, Walworth Mfg. Company, Boston, Mass.; Ralph S. Hamilton, Providence, R. I.; M. W. Mix, Dodge Mfg. Company, Mishawaka, Ind.; M. H. Harrington, Edwin Harrington, Son & Co., Philadelphia, Pa.; Geo. Pope, Hartford, Conn.; H. E. Miles, Racine, Wis.; Ludwig Nissen, New York; David M. Parry, Indianapolis, Ind.; Enos Paullin, Ferracute Machine Company, Bridgeton, N. J.; D. C. Ripley, Pittsburgh, Pa.; F. C. Schwedtman, St. Louis, Mo.; G. D. Selby, Portsmouth, Ohio; Daniel Simonds, Fitchburg, Mass.; Constant A. Meese, San Francisco, Cal.; Giles H. Stilwell, Syracuse, N. Y.; C. A. Michael, Roanoke, Va.; John Trix, Detroit, Mich.

Franklin H. Wentworth, secretary National Fire Protection Association, in an address on "Fire Prevention," urged manufacturers to co-operate to the end that the fire losses be greatly reduced, and offered as a remedy the erection of brick and stone buildings as a whole, which he declared act as natural walls to prevent the spread of conflagrations.

John Candler Cobb, president National Tariff Commission Association, warmly defended the work accomplished by the existing Tariff Board in the effort to secure equitable tariff legislation based on scientific investigation.

Irving T. Bush, president of the Bush Terminal Company, Brooklyn, N. Y., delivered an address on "Banking and Currency Reform," opposing a central bank but favoring a co-operative association of banks to do for the bank exactly what the bank does for the individual.

Hon. M. L. Stewart, Director of Commerce of the Philippines, declared that American exporters are fast losing favor in the Orient because of their carelessness in handling the Oriental trade.

William M. Benney, manager of the foreign department of the National Association of Manufacturers, told of the work done by the association in the promotion of American export trade.

Charles A. Conant, in an address on the Panama Canal, declared that our manufacturers must take immediate action if they would secure the full benefits of the trade expansion which will be offered to them when the canal is opened.

The banquet was attended by over 500. David M. Parry acted as toastmaster and the speakers were Congressman J. W. Fordney of Michigan, Job E. Hedges of New York, and Nathaniel Curry, president Canadian Manufacturers' Association. Mr. Fordney touched on tariff legislation and called attention to the discrimination in favor of imported goods practiced by the railroads of this country. He stated that boots and shoes are shipped from Liverpool to San Francisco at the rate of \$1 per 100 lb., 20 cents of which covered the ocean transportation and 80 cents the railroad freight. Shoes shipped from New Orleans to San Francisco, he said, had to pay \$3 per 100 lb.

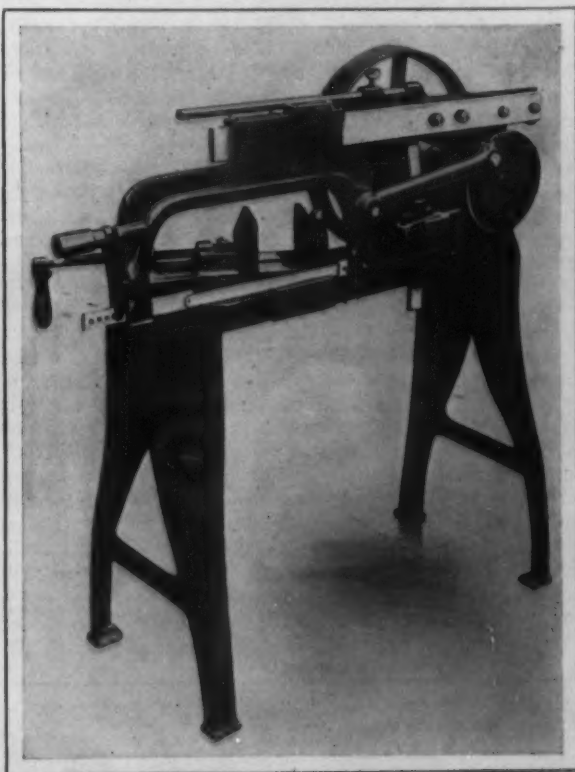
Mr. Curry said that within the past few years over 250 American manufacturers had opened plants in Canada. The industrial development of the Dominion, he declared, had increased over 30 per cent the past five years. He

called attention to the fact that the average rate of duty on foreign goods imported into Canada was much lower than that imposed by the United States. He told of the work of the Canadian Manufacturers' Association, saying that it had various influential committees which looked after legislation, insurance, etc., and succeeded in accomplishing important reforms for the good of Canadian manufacturers.

## The Economy Hack Sawing Machine

Economy is the special advantage claimed for the improved No. 2 power hack sawing machine, manufactured by the W. Robertson Machine & Foundry Company, 32 Greenwood place, Buffalo, N. Y. These machines are made extra heavy throughout to resist the vibration and give long service.

The bed is a one-piece box pattern casting, with the surfaces milled, while the head is milled on the base to fit in housings formed on the bed, an arrangement which, it is pointed out, gives the same rigidity as if these two parts were cast in one. The frame is supported on a finished



The No. 2 Economy Power Hack Saw Built by the W. Robertson Machine & Foundry Company, Buffalo, N. Y.

steel arm having a long milled bearing which is provided with ample lubrication. It is mounted in the center of the supports and is driven from the center with a crank pin. Blades ranging in length from 10 to 14 in. can be accommodated, and perform their work on the draw stroke, being raised above the work of the idle or outward stroke.

The following table gives the principal dimensions and specifications of the machine:

|  |       |
|--|-------|
| Capacity, in. ....                     | 6 x 6 |
| Minimum length of blade, in. ....      | 10    |
| Maximum length of blade, in. ....      | 14    |
| Length of stroke, in. ....             | 6     |
| Diameter of driving pulley, in. ....   | 15    |
| Face width of driving pulley, in. .... | 2 1/2 |
| Speed of driving pulley, r. p. m. .... | 60    |
| Net weight, lb. ....                   | 250   |
| Foreign Shipping weight, lb. ....      | 300   |
| Contents of case, cu. ft. ....         | 9     |

The vise is strong and well made, and all surfaces are finished by milling. It will swivel to an angle of 45 deg. and is held in position by two bolts.

The Worcester Pressed Steel Company, Worcester, Mass., desires bids on a concrete and steel mill building, 100 x 100 ft., one story, monitor roof, to be erected this summer. Contract is to be let before July 1.



## A New Grinding Machine

The Bryant Chucking Grinder Company's One and Two Spindle Type Having a Unique Design of Cross Slide

In addition to the three-spindle chucking grinding machine which was illustrated in *The Iron Age*, November 4, 1909, the Bryant Chucking Grinder Company, Springfield, Vt., has brought out a line of one and two-spindle machines. These new machines are of a simplified design and are adapted to produce the maximum output in duplicate grinding within the limited range of 12 in. in diameter and 6 in. in length. One of the special features is the swinging motion of the cross slide in combination with the overhead cylindrical wheel slide, instead of the usual flat or V-way. Like the former machine these new ones are intended to produce chuck work upon a manufacturing basis, accomplishing all operations by grinding wheels instead of cutting tools and thus securing greater accuracy and better finish. This can be done either from the rough or from surfaces previously obtained in turret lathes. The machine will grind either outside or inside diameters together with the faces of both external and internal shoulders, as it is adapted for work upon which it is necessary to perform only one or two grinding operations at a single holding. Views of the machine with the surface grinding and the internal grinding spindles ready for operation are given in Figs. 1 and 2 respectively, while the rear of the upper portion of the machine is illustrated in Fig. 3. Figs. 4 and 5 are transverse and longitudinal sectional elevations showing the cross slide motion and the overhead location of the cylindrical wheel slide respectively, which are two special features.

As will be seen from Fig. 4, the circular arm *a*, bolted to and forming a part of the wheel head, projects into a pocket under the water pan and rests against the feed screw at *b*, being held there merely by its own weight and by the pull of the belt. The motion of the feed screw is naturally transferred to this arm to give a horizontal feed to the wheel toward the work. It is pointed out that no vibration results from this arrangement, the arm having no action except that of pushing against the screw. In Fig. 5, which is a longitudinal section, the overhead location of the wheel slide is shown, the hardened and ground cylindrical bearings being so protected by brass telescoping sleeves as to remove any chance of grit or dust reaching the controlling bearings. It is pointed out that this type of bearing permits a smooth and even traverse

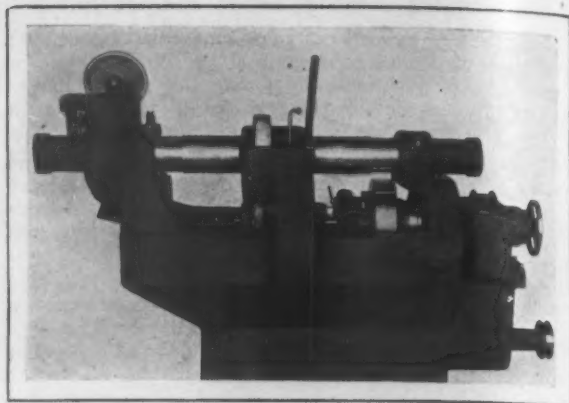


Fig. 3—Rear View of the Upper Portion of the Machine

for the wheel slide and assures permanent control and alignment. The swinging motion about the bearings for the horizontal feed eliminates the chance of error from faulty fitting or adjustment which is sometimes encountered in a gibbed cross slide.

The two machines which are designated by the builder as its No. 6 and No. 6A machines respectively, will grind holes ranging from 1 to 10 in. in diameter and 6 in. in length. The former is the single-spindle type while the latter has a second spindle for face grinding. Both machines are equipped for either power or hand operation, depending upon the class of work to be finished. In the two-spindle machines the radial motion of the slide, which is controlled by the lever projecting upward from this part in Figs. 1 and 2, is used to place the spindles successively in the operating position. By reason of this lever arrangement it is pointed out that the swinging of the spindle is accomplished as easily and quickly as the wheel of the single-spindle machine is swung out of the working position.

The specifications of the one and two-spindle machines are identical with the exception of the additional spindle on the No. 6A machine. The work head has angular adjustments on either side of the center for turning tapers up to 15 deg. The wheel spindle driving shafts are mounted in ball bearings of the inclosed type and require only occasional oiling. Three work speeds, 150, 200 and 350 r.p.m., are available and changes from one to the other can be made while the machine is in operation. The table travels at the rate of 20, 30 or 40 in. per minute.

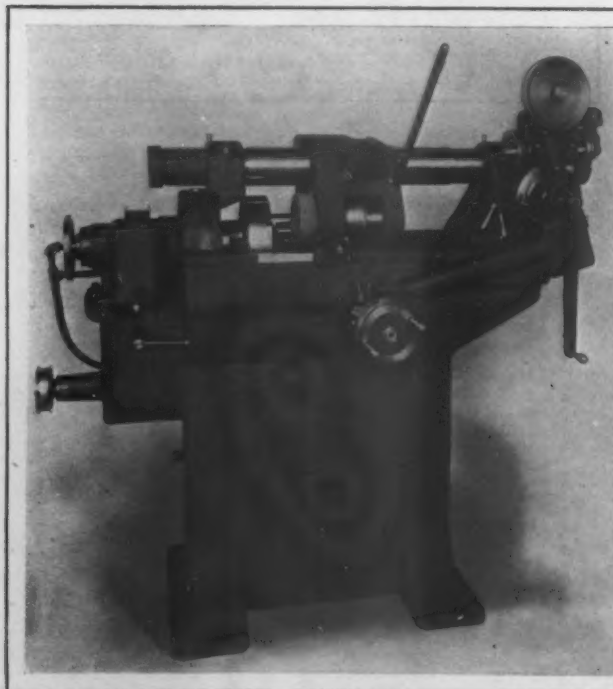


Fig. 1—Surface Grinding

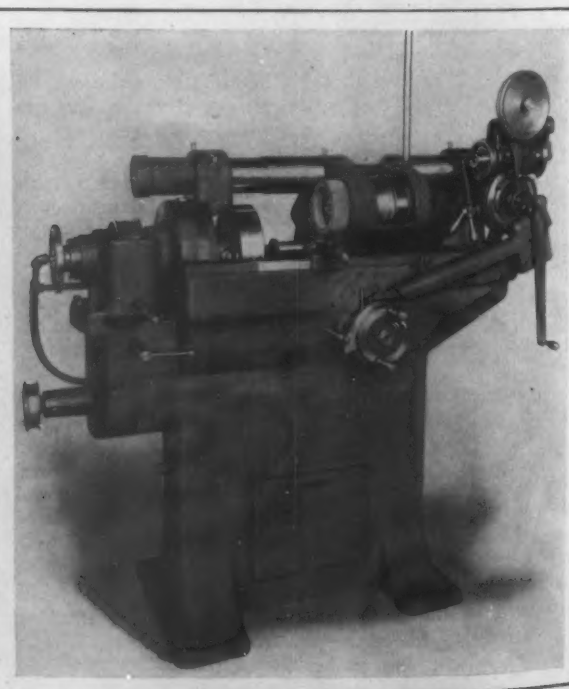


Fig. 2—Internal Grinding

Two Views Showing the Positions of the Two Spindles of the New No. 6A Grinding Machine Built by the Bryant Chucking Grinder Company, Springfield, Vt.

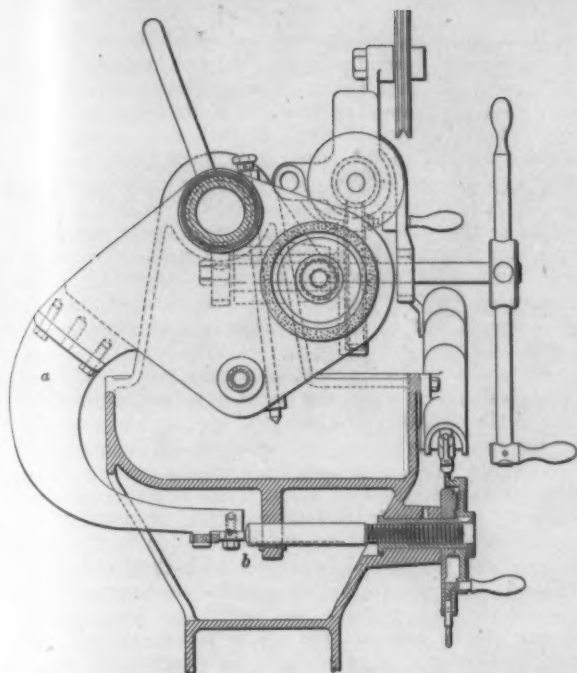


Fig. 4—Sectional Elevation Giving Details of the Cross Feed Slide Motion

The regular equipment of the machine includes a 12-in. automatic chuck operated by a hand wheel designed especially for quick chucking. The water pump and piping are so arranged that water may be carried to the work through the work spindle as is shown in Fig. 5 or by a flexible pipe attached to the wheel carriage as illustrated in Figs. 1 and 2. It will be noticed by referring to Fig. 5 that there is a partition at the left of the reservoir so

### The Pennsylvania Railroad and Its Employees

With 2040 active employees who have been in service 40 years or longer, and with 1572 who served 40 years or more and are now receiving pensions, the Pennsylvania Railroad has a payroll which is probably unique among those of the corporations of this country. No less remarkable is the fact that its records show that to-day there are on its payroll 489 men who have been in its service more than 50 years. One employee has been receiving pay from the company for 66 years. A striking comparison exists between its records and the Carlisle table of mortality used by insurance companies. While the latter shows the expectancy of a man 21 years of age to be 40.75 years, the Pennsylvania Railroad has 4015 employees who have exceeded this.

The company trains its officers from the rank and file. Young men just out of school or college begin in its service by learning the very rudiments of railroading; and there are many years of hard work before they even show their heads above their fellows, or their superiors learn whether they are fitted for promotion. A census recently made of Pennsylvania Railroad officers gives striking evidence of the policy the company pursues in training men. Of 178 officers included in the railroad's official biographical list, 171, or 96 per cent., have been with the company all their business life. Of the 178, those who received a college education number 84, or approximately 50 per cent. The seven cases where officers have not been in the service of the railroad the entire time since leaving school include such as required special training, which the railroad did not offer.

Some 1500 locks are required for the doors of the 39-story building of the Bankers' Trust Company, one of New York's latest skyscrapers, which terminates in a remarkable pyramidal stone roof. The aggregate number of locks shows how important in itself is a relatively small part of the equipment of such a building. The

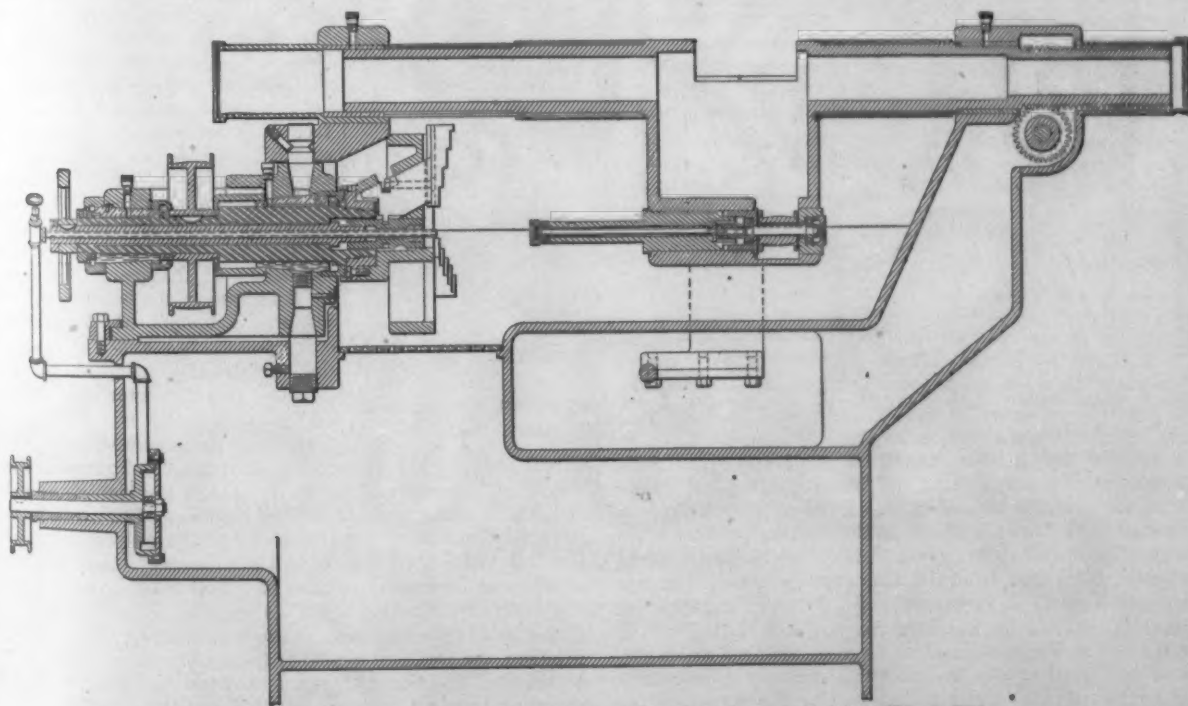


Fig. 5—A Longitudinal Section, Showing the Overhead Location of the Cylindrical Wheel Slide

that any sediment that is brought down by the cooling water from the work and passes through the strainer at the top will settle to the bottom of the reservoir and be prevented from being drawn out and pumped back to the work. Four sizes of wheel quills are made for holes ranging from a minimum diameter and length of  $\frac{3}{4}$  and  $2\frac{1}{2}$  in. respectively up to  $2\frac{1}{2}$  in. in diameter and 6 in. long. The floor space required by the machine is 3 x 6 ft. and the approximate weight is 2000 lb.

The National Founders' Association has moved its general offices to room 842, National Life Building, 29 South La Salle street, Chicago.

locks, which are of the cylinder type made by the Yale & Towne Mfg Company, New York, are arranged so that a master key controls all the locks on an ordinary floor and in addition a grand master key controls all the locks on all the floors. A tenant moreover may set his lock from the inside so that no entrance can be made by any of the master keys.

The Portland Iron & Steel Company, Portland, Me., has changed its name to the Bancroft & Martin Rolling Mills Company. The officers of the new company are: President, Seth L. Martin; clerk, Stephen C. Perry; treasurer, Joseph B. Bancroft.



## A New Steam Turbine

### Details of the Recently Developed DeLaval Multi-Cellular Type

For any given capacity and steam conditions, there is for each type of turbine a speed which will give the highest efficiency and the real task is the securing of the desired ratio between the speeds of the steam and the bucket by arranging the blade lengths, blade angles, disk diameters, heat drops, etc. In solving this problem the designer may select any one of the three principal types of multi-stage turbines, the reaction multi-stage, the velocity multi-stage or the multi-cellular. At the present time the European builders are, with minor exceptions, using the multi-cellular or multi-stage impulse turbine, which in some cases is fitted with velocity stages in the first pressure stage, for the medium sizes up to about 3000 kw. This type of turbine is said to possess the advantages of perfect axial balance without end thrust, and hence does not require balancing pistons, with a waste of steam through leakage and of power by steam friction, and the leakage areas are also smaller than those in the reaction type, being confined to the small diameter annular spaces, where the shaft passes through the diaphragm. As compared with the multiple velocity stage turbine, the multi-cellular type has the advantage of avoiding the excessive friction due to the high relative velocity with which the steam strikes the first row

of steam is admitted to the steam chest at the right end of the casing and flows through nozzles and impinges upon the buckets of the first wheel. The nozzles employed in the first stage are formed of tubes carefully bored and reamed and set in the nozzle ring, or they may be bored and reamed directly in the nozzle ring itself. The nozzles of this stage occupy only a portion of the circumference and any or all of these can be controlled by hand-operated valves seating upon the inlet opening. These valves, however, are not used for speed regulation and are not operated automatically, as it is claimed that the opening or closing of one or more of the nozzles at a time by a governor is apt to induce surgings and fluctuations in speed, and the automatic control of separate nozzles requires a complicated governing mechanism. The buckets or blades against which the steam impinges are made of a special alloy containing nickel and copper, and are formed by the drop forging process which, it is emphasized, imparts to the metal a smooth, hard, glossy coating of oxide that resists the action of water, steam and corrosive acids.

The life of these buckets is said to be practically unlimited when subjected to dry steam, due to the smooth surface and the special metal from which they are made. They are also free from rusting and from brittleness. The tips of the buckets have projections or lugs which fit against similar ones on the adjacent buckets and form a continuous rim. In this way it is pointed out that the fan action of the bucket is diminished and that the spilling of the steam by confining the jets within closed channels

is also prevented. Transverse dovetails are employed to secure the bucket to the rim of the wheel, an arrangement which permits individual buckets to be removed or inserted without disturbing the others and also forms a strong attachment without materially increasing the load thrown upon the wheel by the weight of additional metal. Another advantage of these transverse dovetails is that accurate finishing of the slot in which the bucket is held is made possible and a perfect fit is secured as the straight part of the slot can be milled accurately while the round portion is bored and reamed. The increase in the cross sectional area of the passages required by the expansion of the steam is gained by lengthening the blades, reducing the diameters of the wheels correspondingly and increasing the bore of the casing.

The factors determining the maximum speed at which the turbine may be operated and the

actual capacity for a given set of steam conditions are the length and strength of the blade used in the last wheel and the length of the buckets and the diameter of the wheel. A proper balancing of these factors and the proportioning of the last wheel with respect to the diameter, pressure drop, capacity and terminal pressure have been made possible since the company, drawing upon its experience with a single-stage turbine, has adopted as the best solution of the speed problem, the DeLaval helical reducing gear which was illustrated in *The Iron Age*, April 13, 1911, and it affords the designer freedom in the choice of rotative speeds and in gaining the desired bucket velocity by increased speed of rotation rather than by larger wheels, it is pointed out that the skin friction, leakage and other losses throughout the turbine are reduced.

The wheels upon which the buckets are mounted consist of hydraulically forged steel disks, finished and ground on all surfaces. The hub of each wheel is extended so that it clutches those of the adjacent wheels, an arrangement which permits them to be locked in place by one nut while at the same time, it is emphasized, it increases the thickness of the shaft. These wheels are mounted upon the shaft by taper bushings, which insure perfect centering and permit easy removal should it ever become necessary to take them out. With the exception of the nozzles in the

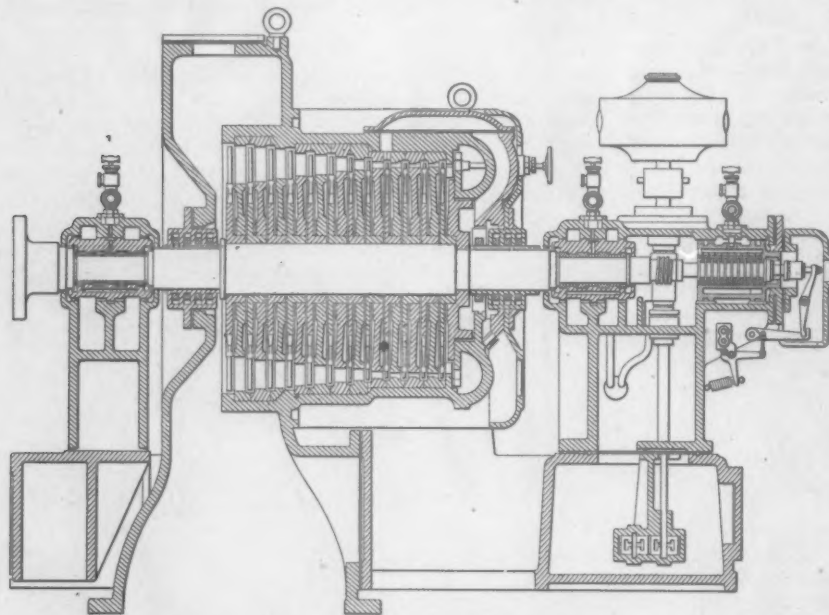


Fig. 1—Axial Section Showing the General Arrangement of the Multi-cellular Turbine Built by the De Laval Steam Turbine Company, Trenton, N. J.

of buckets and it also eliminates the losses due to the spilling of the steam from the bucket during the course of its successive reboundings from the moving buckets to the stationary ones and back to the moving buckets again. It has also been found more adaptable to changes in steam pressure, load, etc., from the fact that the available energy is divided among a larger number of stages and that the steam is utilized by a single row of moving buckets in each stage and it is claimed to be more efficient when governed by throttling than is the multiple-velocity stage turbine. As compared with the reaction turbine the structural security of the multi-cellular type is marked, the disks of the latter, it is emphasized, being stronger than the drum of the reaction type while at the same time this part is very long and is exposed to unequal heats. Bearing all these facts in mind, the DeLaval Steam Turbine Company, Trenton, N. J., has brought out a new type of prime mover in which the multi-cellular principle is embodied. An axial section showing the general arrangement of the turbine is given in Fig. 1, while Fig. 2 shows one of the turbines driving a 1000-kw. direct-current generator.

Referring to Fig. 1 it will be noticed that the rotating member consists of a heavy shaft upon which is mounted a series of disks or wheels, each revolving in its independent cell or chamber formed between diaphragms. The



initial or first stage, those of each succeeding stage are formed between guide vanes set around the entire periphery of the diaphragm. The vanes are made of nickel bronze and are formed in dies and hammered to give a hard and polished surface. They are spaced and located upon the rim of the diaphragm by pins and are held in place by solid steel bands shrunk over their tips. Two pins are used for each vane to determine its proper angle and this, in connection with the shape of the vanes, fixes the contour and the cross sectional area of the nozzles formed between the successive vanes. The adjacent steel bands, which are wider than the vanes and the diaphragm, touch one another, forming a continuous cylinder which incloses not only the diaphragms, but also the rotating wheels, and provides a complete lining of forged steel for the wheels. It is pointed out that this steel armor is a desirable precaution, since cases have occurred where the turbine wheels have burst and the parts have penetrated the casing and caused considerable damage. This, it is said, is not possible in the case of this new turbine. The cast-iron diaphragm disks are perforated at the center and are fitted with removable labyrinth packings to minimize the leakage of the steam from stage to stage between the diaphragms and the cylindrical wheel hubs.

The rings surrounding the guide vanes and diaphragms rest in a cast-iron wheel case, which is split horizontally to render all working parts readily accessible. On account of the comparatively limited number of stages in the turbine, the length of the wheel case is moderate and it is pointed out that it is also free from distortion due to temperature changes as it contains no cored passages or unsymmetrical parts of any kind. To enable the case to expand freely in all directions without altering the position of the axis and throwing the center lines of the wheel case and shaft out of the same plane, the wheel case is supported in the plane of its center line upon two pedestals rising from the bed plate. These pedestals permit the diametrical expansion of the case, while the holding-down bolts, except one on each side, have oval bushings and are prevented from clamping by shoulders on the bolts where they are screwed into the pedestal and the case is free to expand longitudinally between guides on these pedestals. It is emphasized that this arrangement not only prevents distortion, but enables the expansion of the case to increase axial clearance.

The shaft of this turbine, as it will be noticed from both engravings, is very large so that the critical speed is above that of the normal running speeds. In this way it is pointed out serious vibration of the shaft is prevented if the wheel should be thrown out of balance from any cause. As the number of stages in the turbine is small, only a moderate over-all length is required, which makes it possible to place the shaft bearings close together and this naturally increases the critical speed of the shaft and reduces the tendency to vibration. As the pressure of the steam is equal on both sides of any wheel or bucket, the only leakage possible is from stage to stage along the shaft at the point where it passes through the diaphragm and the turbine casing. The problem of minimizing such leakage is, however, greatly simplified by the fact that the pressure difference existing between any two adjacent stage cells does not exceed a few pounds. The labyrinth

packing employed at these points is said to be unusually long and the great thickness of the shaft permits a minimum running clearance. In the first stage leakage outward to the atmosphere is first obstructed by a labyrinth packing of double length, and any steam leaking past it is led back to an intermediate stage and utilized at a lower pressure for generating power. Following this packing is a series of segmental carbon ring packings, each of which is inclosed in a separate compartment. The leakage past the first carbon ring is carried back to the exhaust connection of an intermediate stage of the low pressure packing and live steam is introduced between the two outer rings, so that any inward leakage along the shaft will be steam and not air. Similar carbon rings are employed in the exhaust end and steam is introduced for the same purpose.

The bearings employed in this turbine are of the same type as that used in the builder's high-speed machinery. They are three in number, two main bearings supporting the weight of the revolving parts, while the third is a thrust bearing. The shells are made of cast iron which is thoroughly tinned before the babbitt lining that is poured in while the shell is at the temperature of the melting point of tin is cast, an arrangement which, it is emphasized, secures perfect adhesion between the lining and the shell. After this has been done the lining is bored and reamed to standard dimensions and the exterior of the shell is ground to gauge on all contact surfaces so that it is absolutely interchangeable. To relieve the bearing cap from any strain the two halves of the shells are placed with the dividing line in the vertical plane, and by revolving the bearing about the shaft, either half can be removed or replaced. Water cooling is provided to secure continuous operation at low temperature. The pedestals which are of rigid design and construction have the bearing seats scraped to insure perfect alignment of the shaft and interchangeability of the bearing shells. The joint between the bearing cap and the pedestal has a recessed groove to prevent oil creeping to the outside. As each wheel is surrounded by steam at a uniform pressure, no axial thrust is generated and no balancing devices are required. In order to maintain the endwise position of the shaft and the wheels and to determine the clearances of the turbine an adjustable marine type thrust bearing is provided which is made in practically the same manner as the main one.

The bed plate of the turbine is of the box type and contains the main oil reservoir, oil strainer and oil pump of the lubricating system. The metal is so arranged that this part possesses sufficient strength to keep all parts of the turbine in alignment. The low pressure end of the bed plate is faced for connection to the bed plate of the driven machine.

The governing mechanism is simple, direct and positive and it accomplishes its work by throttling the admission of steam to the steam chest. The governor is of the Jahn's type and is mounted upon a vertical shaft driven by worm gearing from the turbine shaft. The governor valve is of a double-seated balanced poppet type, having adjustable disks and removable seats which can be easily renewed if they become cut. The disks are of a peculiar umbrella shape, designed to avoid unbalancing at different positions corresponding to various rates of flow. For ordinary pressures cast iron is employed for the valve body

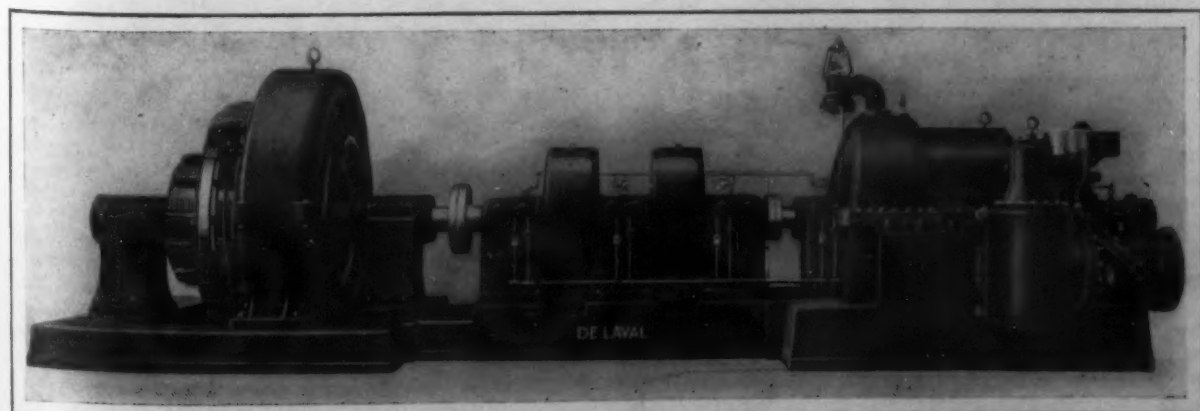


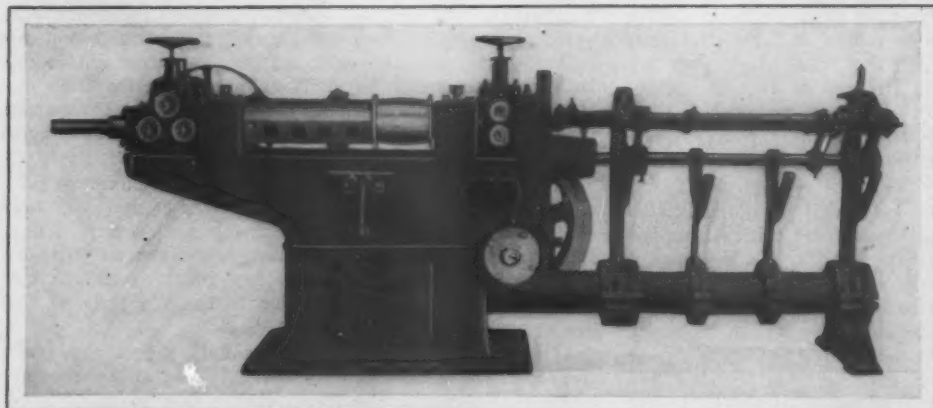
Fig. 2—One of These Turbines Driving a 1000-Kw. Direct-Current Generator Through a 6 to 1 Helical Reduction Gear

and the disks and seats are made of non-corrosive metal, but in the case of superheated steam steel is employed throughout. To provide against any possibility of racing through derangement of the speed governor or an accident to the transmission between the turbine shaft and the governor, or the governor and the valve, a safety stop and quick-operating trip and throttle valve are provided. This safety governor which is entirely independent of the main speed governor is mounted on the end of the main turbine shaft and can be adjusted to act at any predetermined speed. In operation, this auxiliary governor trips a small valve which releases steam pressure under a small piston in the combined trip and throttle valve. This causes the balanced disk on the latter to be forced shut at once by the pressure of the steam acting upon the piston. This trip valve is located ahead of the main governor valve and protects the machine in case of leakage in the latter. If desired it can also be tripped by hand and is intended for use as a throttle valve for starting and stopping the turbine.

All parts of the turbine requiring lubrication are supplied with oil by a circulating pump of the positive geared type, which is driven from the lower end of the governor spindle. The oil supply is drawn through screens or filters from a large reservoir in the bed plate of the turbine and is forced to an elevated storage tank and flows by gravity to sight feed lubricators on each bearing. Oil under high pressure from external sources or forced lubrication is therefore not required.

#### Safety Device for Wire Straighteners

The Hemming Brothers Company, New Haven, Conn., has brought out a safety device for use with wire straightening and cutting machines which eliminates the danger



A New Safety Device for Use with Wire Straightening and Cutting-Off Machines Developed by the Hemming Bros. Company, New Haven, Conn.

of the wire swinging as its end leaves the reel, a tendency which has caused a great many serious accidents. The guard consists of a long stud fixed in the box at the end of the straightener at the side of the mouth of the arbor. The machines are equipped with either one or two such guards. The swing of the wire is interrupted as it strikes the stud and it passes freely into the machine.

The McCoy-Linn Iron Company, Milledgeville, Ga., has elected new officers. Edmund Blanchard is now president, succeeding the late Frank McCoy; L. T. Eddy is secretary, and John McCoy is treasurer. Mr. Eddy has been continuously engaged in the manufacture of charcoal iron for 50 years. For about 40 years of this period he has been employed at the Milledgeville works.

Contracts covering the major portion of the gas equipment required in the reconstruction of the Emporia, Kans., gas plant have been placed with the United Gas Improvement Company, Philadelphia, and the Kerr-Murray Mfg. Company, Fort Wayne, Ind. The consulting engineer on this work is Henry I. Lea, Peoples Gas Building, Chicago.

#### Wallace & Sons' Pension Plan

The R. Wallace & Sons Mfg. Company, Wallingford, Conn., which employs over 1000 hands in the manufacture of solid silver and electroplated ware and cutlery, has announced a pension plan for employees. Its administration is to be in charge of a committee consisting of three members, all officials or employees of the company, to be appointed by the president, F. A. Wallace. Some details of the plan are as follows:

Any man who has been 20 years or longer in the service and has reached the age of 65 years may be retired either at his own request or at the request of his employing officer. Any woman who has been 20 years or longer in the service and has reached the age of 55 years may be retired and pensioned either at her own request or at the request of her employing officer. Any employee who has been 20 years or longer in the service and has been permanently incapacitated through no fault of his own as a result of sickness or injuries received while not on duty may be pensioned at the discretion of the company.

Pensions will be paid only to those employees who have given their entire time to the service of the company. The acceptance of a pension shall not bar any former employee from engaging in other business so long as such other business is not of the same character as the former employment. The monthly pensions to be paid will be made up on the following basis: For each year of service 1 per cent. of the average monthly pay received during the last 10 years of service.

#### Hackettstown Furnace Property to Be Sold

John S. Gibson, receiver of the Carteret Steel Company, 820 Essex Building, Newark, N. J., will sell at public sale at his office on June 24, at 2 p. m., the property owned by

that company, comprising the Green Pond mining tract, in Rockaway Township, Morris County, N. J., containing about 356 acres of land, and the Hackettstown furnace plant, at Hackettstown, Warren County, carrying with it 120 acres. The Green Pond mining tract has been sufficiently developed to warrant belief in the existence of a large body of valuable iron ore and is stated to be about the last of the great ore tracts of New Jersey remaining to be utilized. The ore is a magnetite of high grade, analyzing,

according to a report by John Fulton, 66.96 per cent. iron, 0.62 silica, 1.96 sulphur and 0.004 phosphorus. The blast furnace is 60 x 15 ft., built in 1874-5, rebuilt in 1899, and is not in good condition, having been last active in 1902. Hackettstown is located about 59 miles from New York, on the main line of the Delaware, Lackawanna & Western Railroad, at an altitude of 570 ft. above tidewater.

The Straight Push sash operator made by the G. Drouvé Company, Bridgeport, Conn., is used in the Standard Oil Company's building at Cleveland, Ohio, referred to in the article on "Examples of Concrete Factory Buildings," which appeared in *The Iron Age* of May 23. The article states that the monitor windows are fitted with Detroit Fenestra sash and moved in units 60 ft. long with an operating device. The Drouvé Company will furnish its Anti-Pluvius puttyless, saw-tooth ventilating skylights and Straight Push sash operator for the new buildings of the Defiance Machine Company, Defiance, Ohio, to which reference was also made last week.

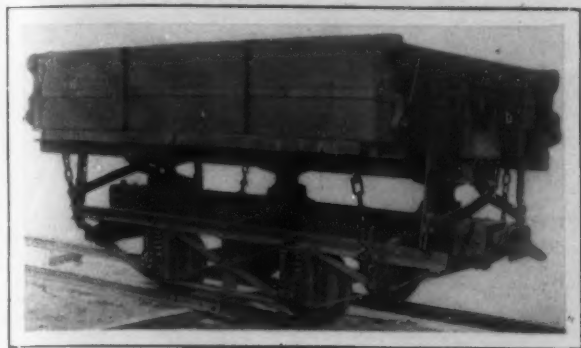
The annual meeting and banquet of the Cleveland Engineering Society will be held at the Hotel Euclid June 11.



### New Square Box Dump Car

A recent development of the Orenstein-Artur Koppel Company, Machesney Building, Pittsburgh, Pa., is the manufacture of a 4-yd. square box dump car with a steel underframe. Among the special advantages claimed for this car are ease in loading, strength, long life and savings in repairs and time.

Cast steel is used for the bumper and the underframe and draft beam are of steel. Cast steel is employed for the rockers and the journals are of malleable iron. The



A New 4-Yd. Square Box Dump Car Built by the Orenstein-Arthur Koppel Company, Pittsburgh, Pa.

body is of oak and the bottom is reinforced by six angle bars, while the chains connecting the box with the truck are adjustable. If desired the body or box is easily removed from the truck.

The material is thrown or carried 4½ ft. from the rail and this, it is emphasized, does not in any way retard or eliminate the 45-deg. angle of the dump, thus permitting more material to be dumped without interfering with the operation of the train. The side doors have automatic dumping devices, an arrangement which enables them to make a clear opening of 4 ft outward and upward at the same time, thus eliminating the possibility of the material binding against the doors.

The arms operating the doors are connected to a knee casting which in turn is connected to the bottom of the door. In this way it is emphasized that a short heavy arm can be used and any shock encountered in ordinary operation when the train pulls ahead with the doors open is not sufficient to throw them out of place.

### The Baltimore Tube Company

A new corporation with a capital stock of \$1,200,000, known as the Baltimore Tube Company, has been formed and has taken over the business of the Tube Bending & Polishing Machine Company, which has been operating a plant at Bayard and Carroll streets, Baltimore, Md., for about a year. The old company has been manufacturing manifolds and other copper parts by an electrolytic process and machines for the building and polishing of metal tubing, under patents of L. H. Brinkman. The new corporation will enlarge materially on its various products, including the manufacture of a new type of condenser tube and the making of seamless flexible brass copper and steel tubing from a single thickness of metal. The company will also install a plant for the drawing of seamless brass and steel tubing. It has leased for a long term a portion of the old People's Gas Company property at Bayard street and the Baltimore & Ohio Railroad, South Baltimore, from the Consolidated Gas, Electric Light & Power Company, comprising several buildings and over six acres of land. The buildings are being altered and repaired to meet the new requirements, and to them the equipment now in the old plant will be transferred. Electric power will be used exclusively, although a steam plant will also be installed.

The machinery requirements for the additional products will be largely of a special nature and are in course of construction at the present plant. Tube-drawing equipment has already been acquired. A portion of the new plant is expected to be in operation by July 1. The officers of the new corporation are: President, Herbert A. Wagner, vice-president Consolidated Gas, Electric Light & Power Company; vice-presidents, Norman James and Daniel C.

Spruance; secretary and treasurer, Walter M. Bush. The directors include F. W. Wood, president Maryland Steel Company; Norman James, Herbert A. Wagner and Daniel C. Spruance, all of Baltimore, Md.; Charles E. Clarke, Henry M. Keith and Edward C. Hyde, of New York.

### Senator Oliver on the Underwood Bill

Senator Oliver of Pennsylvania addressed the Senate May 23 on the Underwood bill reducing duties in the metal schedule. Unusual interest was manifested in his speech by his colleagues on the floor, both Democrats and Republicans. The Senator being a manufacturer of steel brought to bear on the subject his practical experience. He avowed himself ready to "vote for a revision of all tariff schedules just as fast as the tariff board furnishes the necessary information concerning it." He charged that the Democrats in the House, in their desire to weaken the Steel Corporation, had lost sight of the man with a small shop and of the men he employs, and were "playing directly into the hands of the trust." He said the House bill should have its title amended to read: "An act to confirm and perpetuate the power and dominance of the United States Steel Corporation in the steel business of the United States."

### Ball Bearing Polishing Stand

A new ball bearing polishing stand which is designated by the builder as its No. 3 machine, has been brought out by the Gardner Machine Company, Beloit, Wis. The special feature about this machine is the use of ball bearings throughout the stand proper and also in the countershaft.

The spindle, which has a maximum diameter tapers down to 1¼ in. It extends 15 in. on either side of the base and is 39 in. above the floor. The arbor, which is 1¼ in. in diameter, forms a shoulder for the 4½-in. wheel collar. The spindle pulley measures 5 in. in diameter and is 4½ in. across the face. The two radial ball bearings in this pulley are protected against the entrance of dust or grit by special cases and are lubricated by compression grease cups. Spacing collars to be used when various widths of polishing wheels are used form a part of the regular equipment of the stand.

The countershaft hangers are of an improved ball bearing type and are fitted with two adapted bearings.



The New No. 3 Ball Bearing Polishing Stand Built by the Gardner Machine Company, Beloit, Wis.

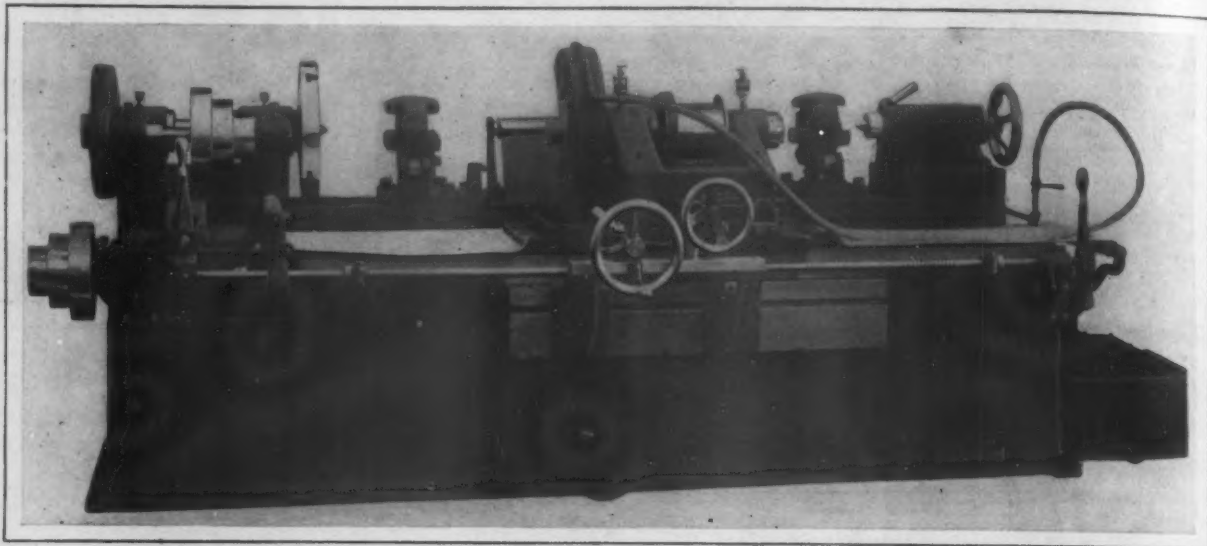
The tight and loose pulleys are 8 in. in diameter and have a face width of 5½ in. and the loose pulley is fitted with two radial ball bearings. The diameter of the driving pulley is 18 in. and the face width 5 in. It operates at a speed of 750 r.p.m. and drives the machine at 2700 r.p.m.

The report is published that the iron and steel works at Han Yang, China, is to have its capacity doubled, Japanese interests being expected to invest \$4,000,000 for the purpose. This is the plant from which pig iron is being imported on the Pacific coast.

### A Special Roll Grinding Machine

For grinding concave rolls and also for doing internal grinding work, the Springfield Mfg. Company, Bridgeport, Conn., has brought out a special roll grinding machine.

and power to many cities in that section of Georgia. The hydroelectric plant will have a maximum capacity of 90,000 hp. and will be connected with Atlanta, Marietta, Cartersville, Rome, East Point, Fairburn, Newnan and La Grange, in which cities the Georgia Power Company



A Special Roll Grinding Machine for Handling Work Measuring 12x54 In. Built by the Springfield Mfg. Company, Bridgeport, Conn.

The capacity of the machine is rolls 12 in. in diameter and 54 in. long, the former for grinding these being located directly under the hand wheels.

The construction of the former is somewhat similar to a taper attachment and is adjustable. In operation the intermediate slide on which the wheel head is mounted is forced against the former by a heavy spring and the grinding operation is practically automatic, the wheel being fed by a small hand wheel. The wheel face has a slight curve which is necessary to reproduce the curve on the former. The two rests on either side of the wheel head are for revolving the rolls in their own journals and are adjustable.

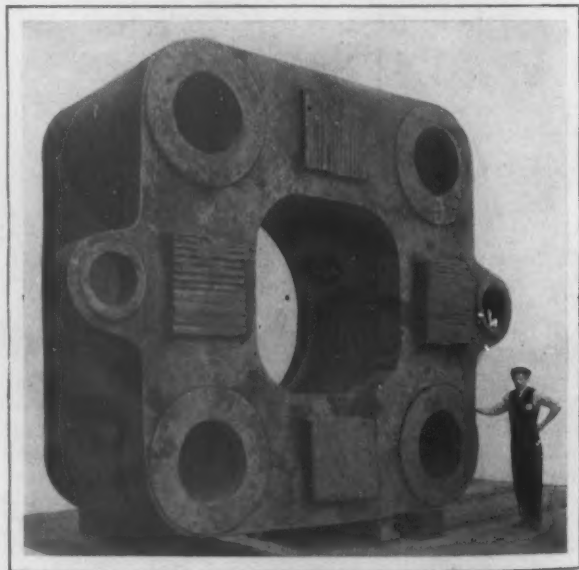
When the machine is arranged for doing internal grinding the internal attachment is placed directly in front of the wheel as shown in the accompanying engraving and is driven by a belt running over a pulley which is a part of the main pulley for driving the grinding wheel. When it is desired to turn out either straight or curved grinding, it is simply necessary to remove this attachment. The automatic reversal of the grinding wheel is secured by the rod in front which is equipped with the customary tripping dogs and in turn engages with the reversing lever shown in the speed box at the left. When this lever is put in the neutral position the small lever at the right is pressed against the retaining drum and the mechanism is disconnected. During this time the wheel head is moved forward and backward by hand by a revolving nut and stationary screw.

The machine is equipped with a pump and the necessary attachments for doing wet grinding and ample provision has been made for proper lubrication and the covering of the exposed parts. The ways for the wheel head are covered by automatic rollers which wind and unwind as the wheel head moves backward and forward. The weight of the machine is 7250 lb.

owns franchises. A two-circuit high-tension transmission line is now being erected with a distributing system to serve a population of about 200,000 people.

### A Heavy Bethlehem Steel Casting

The accompanying illustration is a reproduction of a photograph of the steel cap of a 10,000-ton hydraulic press which is now being built by the Bethlehem Steel Company, South Bethlehem, Pa., for the Carnegie Steel Company's Schoen wheel plant at McKees Rocks, Pa. A description



A Bethlehem Steel Casting Weighing 375,000 Lb.

### William B. Pollock Company's Pipe Line Contract

Within a few weeks the William B. Pollock Company, Youngstown, Ohio, builder of all kinds of heavy plate work, will begin active operations on its contract for laying a large pipe line for the Georgia Power Company, Tallulah Falls, Ga. Placing the pipe in position will be a difficult task, as five parallel lines will ascend the mountain side a distance of 1100 ft. to the tunnel that conveys the water from the reservoir which the company has erected in the Appalachian mountains. The line is intended to convey the water to the power station at the foot of the mountains, where its volume and abrupt fall will be used to operate electric generators, supplying light

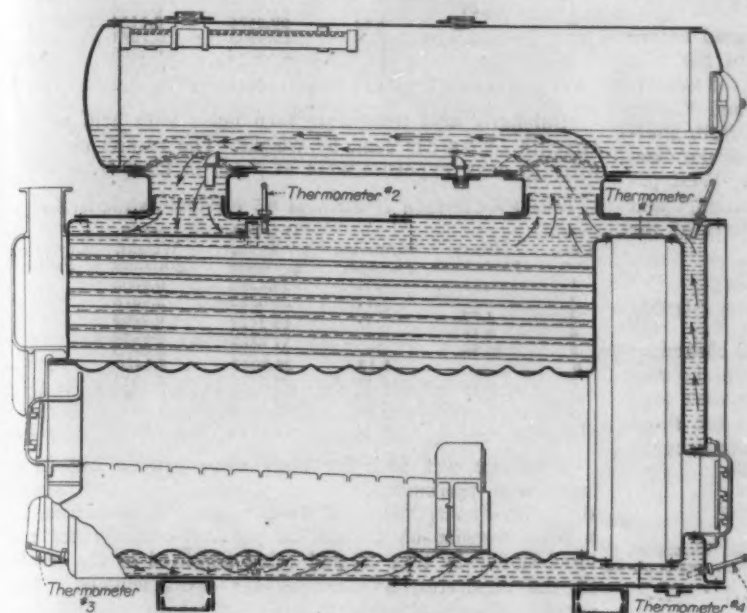
of this press was given on page 1296 of *The Iron Age* of May 23. The cap weighs 375,000 lb., and is only one of the several large steel castings and forgings in this contract. The size of the cap is well indicated by the figure of the workman standing beside it.

At Hamburg, Germany, May 23, Emperor William christened the world's largest ship, the Hamburg-American liner *Imperator*, which was launched on that day. The *Imperator* is 898 ft. long, 95 ft. wide and 103 ft. high, being 10½ ft. longer than the *Titanic*. From the captain's bridge to the water line the distance is 81 ft. The ship has a tonnage of 50,000 and accommodations for 5,000 passengers.



### Circulation Test of a Steam Boiler

A test for water circulation was made March 31 of a Robb-Brady scotch boiler at the Sewerage Pumping Station, Framingham, Mass. The boiler was equipped with thermometer oil wells at the four points indicated in



Section of Boiler Showing Location of Thermometers

the accompanying illustration. With water in the boiler at about 80 deg. the fires were started and readings of the thermometers taken every 5 min. The following table shows the results of the tests:

Tests of Water Temperatures in a 50 H. P. Robb-Brady Scotch Boiler.

| Time<br>P.M. | Thermometer<br>No. 1: | Thermometer<br>No. 2: | Thermometer<br>No. 3: | Thermometer<br>No. 4: |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 3:40.....    | 114 deg. F.           | 112 deg. F.           | 80 deg. F.            | 82 deg. F.            |
| 3:45.....    | 126                   | 124                   | 80                    | 82                    |
| 3:50.....    | 138                   | 140                   | 80                    | 83                    |
| 3:55.....    | 150                   | 150                   | 81                    | 84                    |
| 4:00.....    | 170                   | 170                   | 82                    | 86                    |
| 4:05.....    | 194                   | 190                   | 84                    | 87                    |
| 4:10.....    | 210                   | 210                   | 98                    | 90                    |
| 4:15.....    | 226                   | 224                   | 210                   | 136                   |
| 4:20.....    | 231                   | 230                   | 226                   | 180                   |
| 4:25.....    | 244                   | 242                   | 234                   | 230                   |
| 4:30.....    | 258                   | 260                   | 252                   | 248                   |
| 4:35.....    | 276                   | 278                   | 268                   | 270                   |
| 4:40.....    | 292                   | 292                   | 292                   | 290                   |
| 4:45.....    | 310                   | 308                   | 306                   | 310                   |
| 4:50.....    | 328                   | 330                   | 328                   | 328                   |
| 4:55.....    | 330                   | 330                   | 328                   | 330                   |
| 5:00.....    | 327                   | 328                   | 327                   | 327                   |

\* Safety valve blowing off.

### American Blower Company's Annual Convention.

The annual convention of the branch office managers and salesmen of the American Blower Company was held at the general offices of the company, in Detroit, May 2, 3 and 4. All of the sales offices of the company, with the exception of those on the Pacific coast, were represented. The three days were devoted to the discussion of matters of interest connected with the sales work of the company. A uniformly optimistic feeling regarding the business outlook was apparent. While the gathering was strictly for business purposes, social features were not overlooked, among them being a dinner at Hotel Pontchartrain on Thursday evening. On Friday evening a team selected from the branch offices contested with one from the home office in a bowling match for a loving cup offered by the president to the successful team. It was carried off by the branch office team.

The Van Dorn & Dutton Company, Cleveland, Ohio, maker of gears and portable electric drills and reamers, has established two additional branch offices—one in Atlanta, Ga., in the Cambler Building, in charge of W. F. Davis as district sales manager, and the other in Los Angeles, at 325 Security Building, in charge of J. L. Davidson as district sales manager. This company will also hereafter carry a stock at its branch in San Francisco and will make shipment for Pacific coast deliveries from that point.

### Pig Iron Contract Stipulations

In the paper and discussion on "Contract Obligations" presented at the meeting of the American Iron and Steel Institute in New York, May 17, it was brought out that the present form of contract between steel manufacturers and buyers might well be revised on lines more distinctly defining the obligation of the buyer. Reference was made in the discussion to the binding character of the contracts commonly entered into between furnace companies or selling agents and the consumers of pig iron. In this connection interest attaches to the form of contract which has been used for a number of years by the members of the Eastern Pig Iron Association. It provides in simple terms that "..... agrees to sell and ship and ..... agrees to buy and receive" a specified tonnage of pig iron. The grade is indicated and any specifications as to analysis. Time of shipment is then stated, also delivery, price and terms of payment. The features of special interest are the following paragraphs, which relate to cancellations or any other interruptions to deliveries under the contract:

"Each month's shipments to be treated as a separate and independent contract, but if buyer fails to fulfill terms of payment under any of these separate contracts, or other contracts with seller, seller may defer performance of all the remaining contracts of shipment until payment is made, or may rescind such remaining contracts at its option. Waiver by the seller of the terms of payment in any instance shall not be construed as an abandonment of its said rights.

"Strikes, differences with workmen, accidents to machinery, fires, floods, wars, interruption to transportation or car supply, or to sources of supply of raw materials, or other contingencies beyond the reasonable control of the seller to be sufficient excuse for any delay traceable to such causes. Similar conditions affecting the works of the buyer shall be sufficient excuse for any delay in accepting shipments traceable to such causes. In the event of such delays, shipments will be made pro rata as nearly as practicable on all contracts then uncompleted.

"Buyer shall have the privilege of cancelling any shortage of any month's deliveries by giving notice in writing of such cancellation to the seller during the succeeding month, but seller shall have ten days after receipt of said notice within which to make up said shortage; any shortage not shipped during said ten days shall be cancelled. In case of failure to receive by buyer, seller shall have privilege of cancellation upon the same conditions as above. In case neither party shall exercise this right of cancellation, it is understood and agreed that no cancellation can thereafter be made, and the amount of said shortage shall be delivered and received, the period of deliveries under the contract being proportionately extended, unless time of deliveries shall be otherwise agreed upon in writing. Unless otherwise arranged, any shortage not cancelled as above shall be postponed and delivered after completion of the regular deliveries stipulated under the contract. Notice of cancellation of any month's quota shall not affect the deliveries of any other month."

The Panama Canal bill as passed by the House of Representatives May 23 provides that American ships shall be admitted to the waterway free of charge. The measure debars from the canal vessels owned directly or indirectly by railroads. Both propositions will be attacked in the Senate. Leaders in the Senate insist that our treaty obligations with Great Britain are such that American ships that use the canal must be taxed if a tax is levied on foreign shipping. The bill provides that ships other than American-owned shall pay a toll not to exceed \$1.25 per net registered ton. It authorizes the President to discontinue the Isthmian Canal Commission and shoulders on him responsibility for the canal and its operation.

## Corrosion of Iron and Steel

### Contributions to an Absorbing Subject Made by Three Papers Read Before the Iron and Steel Institute, London, May 9

Three papers dealing with corrosion were read before the meeting in London, England, on May 9, of the Iron and Steel Institute. Two of these were under the authorship of J. Newton Friend, J. Lloyd Bentley and Walter West, and the other was contributed by C. Chappell, Sheffield, and covered the "Influence of Carbon on the Corrodibility of Iron." One of the Friend-Bentley-West papers was entitled "The Mechanism of Corrosion," and discussed "The Corrosion Zone." Leading points of the three papers are given below:

### Corrosion of Nickel and Chromium Steels

The influence of nickel, and likewise that of chromium and of a mixture of nickel and chromium, upon the corrodibility of steel was investigated. The steels were supplied in the form of bars and were tool-turned and sliced into disks 0.7 centimetre thick and 2.8 centimetres in diameter.

Table I.—Analyses of Steel Disks Investigated

| Steel No. | Carbon per cent. | Silicon per cent. | Phosphorus per cent. | Manganese per cent. | Sulphur per cent. | Nickel per cent. | Chromium per cent. |
|-----------|------------------|-------------------|----------------------|---------------------|-------------------|------------------|--------------------|
| 1         | 0.29             | 0.14              | 0.023                | 0.39                | 0.024             | ...              | ...                |
| 2         | 0.39             | 0.208             | 0.023                | 0.685               | 0.036             | ...              | ...                |
| 3         | 0.19             | ...               | ...                  | 0.29                | ...               | 3.72             | ...                |
| 4         | 0.24             | ...               | ...                  | 0.46                | ...               | 6.14             | ...                |
| 5         | 0.08             | ...               | ...                  | 0.38                | ...               | 26.24            | ...                |
| 6         | 0.32             | ...               | ...                  | 0.36                | ...               | ...              | 1.12               |
| 7         | 0.11             | ...               | ...                  | 0.110               | ...               | ...              | 3.58               |
| 8         | 0.09             | ...               | ...                  | trace               | ...               | ...              | 5.30               |
| 9         | 0.552            | 0.127             | ...                  | 0.41                | ...               | 3.40             | 1.00               |
| 10        | 0.54             | ...               | ...                  | 0.58                | ...               | 3.5              | 1.12               |

The disks were carefully polished with emery-paper, weighed, and subjected to corroding influences. They were laid flatwise on a circular sheet of paraffin wax in a glass crystallizing dish, as shown in Fig. 1, covered with faucet water to a depth of 6 c. and kept in a dark cupboard to prevent any irregularity of corrosion consequent upon unequal illumination. The paraffin served to reduce to a minimum the possibility of galvanic action, and also prevented the corrosive action of the silica—always observed if iron lies for any length of time in direct contact with glass. After 64 days the disks were removed, cleaned, and weighed, the loss in weight being taken as a measure of the corrosion. The results are given in table II.

Table II.—Corrosion of Steel in Faucet Water.

| Steel No. | Nickel per cent. | Chromium per cent. | Original Weight, grammes | Loss in Weight, grammes | Corrosion Factor |
|-----------|------------------|--------------------|--------------------------|-------------------------|------------------|
| 1         | ...              | ...                | 35.6201                  | 0.0961                  | 100              |
| 2         | ...              | ...                | 37.4186                  | 0.1038                  | 108              |
| 3         | 3.72             | ...                | 33.5506                  | 0.0798                  | 83               |
| 4         | 6.14             | ...                | 30.1416                  | 0.0666                  | 69               |
| 5         | 26.24            | ...                | 33.4796                  | 0.0488                  | 51               |
| 6         | ...              | 1.12               | 28.7101                  | 0.0817                  | 85               |
| 7         | ...              | 3.58               | 28.6826                  | 0.0558                  | 58               |
| 8         | ...              | 5.30               | 31.1996                  | 0.0400                  | 43               |
| 9         | 3.4              | 1.00               | 30.8926                  | 0.0736                  | 77               |
| 10        | 3.5              | 1.12               | 31.5880                  | 0.0844                  | 87               |

Sea-water tests were then conducted in a precisely similar manner. After 64 days the loss in weight of the steels was found as given in table III.

Table III.—Corrosion of Steels in Sea Water

| Steel No. | Nickel per cent. | Chromium per cent. | Original Weight, grammes | Loss in Weight, grammes | Corrosion Factor |
|-----------|------------------|--------------------|--------------------------|-------------------------|------------------|
| 1         | ...              | ...                | 34.4619                  | 0.1136                  | 100              |
| 2         | ...              | ...                | 37.5729                  | 0.1196                  | 105              |
| 3         | 3.72             | ...                | 30.9664                  | 0.0886                  | 77               |
| 4         | 6.14             | ...                | 32.9744                  | 0.0906                  | 79               |
| 5         | 26.24            | ...                | 30.2324                  | 0.0516                  | 45               |
| 6         | ...              | 1.12               | 28.7259                  | 0.0686                  | 60               |
| 7         | ...              | 3.58               | 25.9639                  | 0.0291                  | 26               |
| 8         | ...              | 5.30               | 30.9149                  | 0.0261                  | 23               |
| 9         | 3.4              | 1.00               | 30.6344                  | 0.0936                  | 82               |
| 10        | 3.5              | 1.12               | 29.1314                  | 0.1026                  | 90               |

Sulphuric acid tests were obtained in an exactly similar manner, the corroding liquid being 0.05 per cent. sulphuric acid (that is, 0.5 g. of acid in 1000 g. of solution with water). The results obtained after 60 days' exposure are given in table IV.

Table IV.—Corrosion of Steels in 0.05 per cent. Sulphuric Acid

| Steel No. | Nickel per cent. | Chromium per cent. | Original Weight, grammes | Loss in Weight, grammes | Corrosion Factor |
|-----------|------------------|--------------------|--------------------------|-------------------------|------------------|
| 1         | ...              | ...                | 37.9886                  | 0.1594                  | 100              |
| 2         | ...              | ...                | 37.2552                  | 0.1560                  | 98               |
| 3         | 3.72             | ...                | 32.2582                  | 0.1350                  | 85               |
| 4         | 6.14             | ...                | 31.8352                  | 0.1320                  | 82               |
| 5         | 26.24            | ...                | 31.4352                  | 0.0860                  | 54               |
| 6         | ...              | 1.12               | 29.2676                  | 0.1134                  | 71               |
| 7         | ...              | 3.58               | 29.9346                  | 0.1088                  | 68               |
| 8         | ...              | 5.30               | 30.8742                  | 0.1086                  | 68               |
| 9         | 3.4              | 1.00               | 30.8136                  | 0.1394                  | 87               |
| 10        | 3.5              | 1.12               | 32.4194                  | 0.1492                  | 93               |

Sulphuric acid tests were then made with acid of the strength of 0.5 per cent. by weight. The results obtained after 53 days' exposure were as given in table V.

Table V.—Corrosion of Steels in 0.5 per cent Sulphuric Acid

| Steel No. | Nickel per cent. | Chromium per cent. | Original Weight, grammes | Loss in Weight, grammes | Corrosion Factor |
|-----------|------------------|--------------------|--------------------------|-------------------------|------------------|
| 1         | ...              | ...                | 34.4266                  | 0.9608                  | 100              |
| 2         | ...              | ...                | 36.6388                  | 2.4878                  | 259              |
| 3         | 3.72             | ...                | 32.1346                  | 0.5308                  | 55               |
| 4         | 6.14             | ...                | 31.9370                  | 0.6042                  | 63               |
| 5         | 26.24            | ...                | 31.9886                  | 0.0770                  | 8                |
| 6         | ...              | 1.12               | 28.8042                  | 2.1420                  | 223              |
| 7         | ...              | 3.58               | 28.9772                  | 0.5830                  | 61               |
| 8         | ...              | 5.30               | 30.6176                  | 0.7514                  | 78               |
| 9         | 3.4              | 1.00               | 30.9126                  | 1.2722                  | 132              |
| 10        | 3.5              | 1.12               | 33.6036                  | 3.9672                  | 413              |

Alternate wet and dry tests were carried out in a large iron thermostat, of the dimensions and shape shown in Fig. 2, the metal disks being laid, as before, in a circle flatwise on a sheet of paraffin wax. Water entered slowly by tube A, and being admitted to the centre of the apparatus, affected all the disks equally. The paraffin disk was perforated by numerous small holes, and rested on a similarly perforated iron disk to enable it to bear the weight of the steels. When the water reached the level B, it was quickly siphoned off automatically by BC, and the level fell to D. It then began

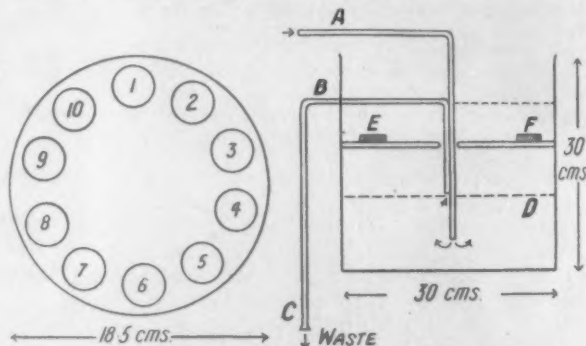


Fig. 1

Fig. 2

to fill again. In this way the metal disks were exposed to alternate wet and dry, the process of filling the thermostat requiring two hours each time. A loosely fitting cover was placed on the top to keep out dust, and to maintain darkness within, in order to prevent, as before, any irregularity of corrosion consequent upon unequal illumination. The results obtained after an exposure extending over 52 days were as given in table VI.

Table VI.—Corrosion of Steels Alternately Wet and Dry

| Steel No. | Nickel per cent. | Chromium per cent. | Original Weight, grammes | Loss in Weight, grammes | Corrosion Factor |
|-----------|------------------|--------------------|--------------------------|-------------------------|------------------|
| 1         | ...              | ...                | 38.5536                  | 0.2706                  | 100              |
| 2         | ...              | ...                | 38.7170                  | 0.2720                  | 100              |
| 3         | 3.72             | ...                | 28.3870                  | 0.1165                  | 43               |
| 4         | 6.14             | ...                | 31.8660                  | 0.0985                  | 36               |
| 5         | 26.24            | ...                | 30.8160                  | 0.0220                  | 8                |
| 6         | ...              | 1.12               | 28.5846                  | 0.2512                  | 93               |
| 7         | ...              | 3.58               | 28.3886                  | 0.0806                  | 30               |
| 8         | ...              | 5.30               | 30.8406                  | 0.0556                  | 21               |
| 9         | 3.4              | 1.00               | 29.8748                  | 0.1274                  | 47               |
| 10        | 3.5              | 1.12               | 32.7956                  | 0.1404                  | 52               |

### Accelerated Corrosion Unreliable

Acceleration tests as usually carried out with sulphuric acid, yield very misleading results as to the general corrodibility of the metals tested. Thus, for example, the two standard steels corroded at almost identical rates when exposed to faucet water, sea water, wet and dry, and to 0.05 per cent. sulphuric acid: But in the 0.5 per cent. acid the second steel corroded some two and a half times as rapidly as the first. Very similar discrepancies occur with steels Nos. 6, 9, and 10, the last named corrod-



ing more than three times as much as steel No. 9, although in the other tests the two steels behaved similarly, as we should expect from their analogous compositions.

These observations are in perfect harmony with those of Frazer, who found that while samples of basic and acid steel of analogous composition corroded at practically identical rates under ordinary conditions, yet when exposed to the action of dilute sulphuric acid the results were most irregular, in one case the acid steel corroding five times as rapidly as the basic steel. The results of the Corrosion Committee of the British Association emphasize the same fact, and C. M. Chapman, working in America, has been led to similar conclusions.

#### Results of the Tests

In neutral corroding media the resistance offered to corrosion apparently rises with the percentage of chromium. This is particularly the case for salt water, and the employment of chromium steels in the construction of ships would appear to be fully justified on this ground alone.

Nickel steels appear to be resistant to acid and neutral corroding media alike, the resistivity increasing with the percentage of nickel. The permanence of the 26 per cent. nickel steel towards 0.5 per cent. acid is particularly noteworthy.

The corrosion factor does not appear to be a purely additive quantity. Thus, for example, in exposure tests with faucet water, the corrosion factors of steels Nos. 3 and 6 respectively are 83 and 85. We might expect, therefore, that since the 3.72 per cent. of nickel and the 1.12 per cent. of chromium each separately yield the same protection, by having both together in the steel the same result should accrue as by either doubling the nickel or the chromium content alone. This, however, is not the case, as is evident from a consideration of the results obtained with steels Nos. 4, 7, 9, and 10. Similar conclusions are arrived at from the sea water, and other tests with the same steels.

### The Corrosion Zone

When a plate of iron is suspended in stationary water, the surface of which water has free access to the air, the layers of water in contact with the metal yield up their dissolved oxygen and thereby induce corrosion. Fresh supplies of oxygen from the surrounding layers of water now diffuse towards the metal, and in the course of a few hours an equilibrium is set up, the amount of oxygen diffusing towards the metal being exactly equal to that absorbed in producing rust. [A number of tests in proof of the contention were described.]

In order to obtain trustworthy results for the relative corrosions of various irons and steels by immersion in still liquids in troughs, the plates must be suspended considerably further apart than has hitherto been customary. With painted, galvanized, and tinned plates, of course the case is quite different, for, owing to the slow rate of corrosion, the corrosion zone is correspondingly reduced and the plates may be much nearer together. In moving water, likewise, the plates may be nearer, but in both of these cases it is better not to have them too close together, or films of dust may spread from plate to plate and thus galvanically connect them and induce serious corrosion.

#### Influence of Light on Corrosion

In the above experiments the troughs were kept in the dark during the periods of exposing the plates, in order to prevent the disturbing influences of unequal illumination. In actual practice the influence exerted by suspending two plates close together would be even greater than that indicated in the above experiments, since one plate would cast a shadow on the other and thus withdraw from it the stimulating action of light.

Light accelerates corrosion in one or both of two ways: 1. By accelerating the initial stage of corrosion, namely, the oxidation of the metal to the ferrous condition. 2. By accelerating the second stage of corrosion, namely, the oxidation of the ferrous iron to ferric (rust).

As time goes on the accumulation of rust and ferrous

oxide becomes so thick that light cannot easily penetrate, and the corrosion proceeds as if the metal were in the dark. Hence the reaction slows up, and the percentage of ferrous iron in the rust begins to fall. This accounts for the relatively small quantities of ferrous iron found in thick rust deposits, even when metallic iron still remains. When all the iron has been oxidized, of course the ferrous oxide slowly follows suit, until even the last traces may be oxidized. There can be little doubt that numerous other factors, such as galvanic action, temperature, nature of the corroding medium, etc., will affect the relative proportions of ferrous and ferric oxide produced during the corrosion of iron.

### Influence of Carbon on Corrosion

A series of practically pure iron-carbon steels were prepared. Bars of each steel were subjected to typical heat treatments, and their relative corrodibilities and other properties have been investigated in each of these various states of heat treatment. By these means, not only was the influence exerted on these properties by variations in carbon percentage determined, but also the influence of variations in the chemical and physical condition in which the carbon exists in these alloys, within the range of commercial treatments.

Test-bars,  $4\frac{1}{2}$  in. long by  $\frac{3}{4}$  in. diameter, were prepared from each steel in all states of treatment. After polishing, the bars were accurately weighed, immersed in 'pure ether for at least an hour to remove all grease, dried in a vacuum desiccator, and then suspended in 700 c. c. of filtered sea water. After 91 days' immersion, the bars were taken out, well washed, cleaned with chamois leather until all adherent deposits were removed, dried thoroughly, and weighed again. The bars were then re-immersed in the same jars and sea water as before, for a further period of 75 days, cleaned thoroughly again and re-weighed.

#### Summary of Results

*Influence of Carbon on Corrodibility.*—(a) In rolled, normalized, and annealed steels the corrodibility rises with carbon contents to a maximum at saturation point (0.89 per cent. carbon), and falls with further increase of carbon beyond this point. (b) In quenched and tempered steels a continuous rise in corrodibility occurs, with increase of carbon within the range investigated (up to 0.96 per cent. carbon), no maximum corrodibility at saturation point being found in these steels.

*Influence of Treatment on Corrodibility.*—Quenching increases the corrodibility to a maximum; annealing tends to reduce it to a minimum; while normalizing gives intermediate values. The influence of tempering varies with the tempering temperature.

*Factors Determining Corrodibility.*—The electromotive forces between the pearlite and ferrite, and between the components of the pearlite itself, are the principal factors determining the corrodibility of unsaturated pearlitic steels above 0.4 per cent. carbon. In mild structural steels, this galvanic action, due to differences of potential between the constituents, is accompanied by galvanic action between the ferrite crystals themselves. These differences of electro-potential between the ferrite crystals are the result of differences in their orientation. The state of division of the pearlite, and the presence of internal stresses in the steel, may also exert a considerable modifying influence on the foregoing factors.

The influence of time on the rate of corrosion varies with different steels. In a low-carbon steel it is shown to be practically directed proportional to the length of immersion.

Three per cent. of tungsten produces practically no change in the corrodibility of carbon steels.

Decarbonization increases the resistance to corrosion.

The two oxides, FeO and Fe<sub>2</sub>O<sub>3</sub> (mill scale), both exert a microscopical pitting effect on steel when in contact with it in sea water.

The Thomas W. Pangborn Company, making a specialty of sand blast appliances, Jersey City, N. J., announces that after June 1 Hagerstown, Md., will be the home of its general offices and plant.

## Iron Corrosion Investigations\*

### Effect of Various Substances on the Rate of Corrosion of Iron by Sulphuric Acid

BY OLIVER P. WATTS†

In Vol. 8 of the transactions of this society, C. F. Burgess called attention to the remarkable reduction in the corrosion of iron by sulphuric acid, brought about by the addition of a small amount of arsenious oxide to the acid. Later he explained the protective action as follows: "The explanation which has been offered for this phenomenon is that the iron receives, by contact with the solution, an extremely thin coat of arsenic, which resists the action of the acid and protects the underlying metals." He also gave experimental proof that the iron was coated with arsenic.

#### Metal Coatings Which Are Stimulators of Corrosion

It has long been known that by dipping clean iron into solutions of suitable composition and concentration thin coatings of gold, silver, platinum, copper and several other metals may be deposited on the iron. It is generally conceded that such coatings are not sufficiently continuous and impervious to protect the underlying metal from corrosion, even though the metal forming the coating may itself be thoroughly resistant to the corrosive agent. Instead of being a protection, such coatings are usually considered to be stimulators of corrosion.

Since all metals which thus deposit upon iron when it is immersed in a solution of the metallic salt are electro-negative to iron, a short-circuited voltaic cell is formed, of which the iron is anode and the metal deposit is the cathode. So long as any iron remains in contact with the electrolyte it would seem, except for certain considerations which will be presented later, that the corrosion of the iron ought to be stimulated by this condition, and that the only way in which such a coating could afford good protection would be by covering the iron completely, so that no electrolyte could come in contact with it.

Speaking of the effect of other metals in contact with iron, W. H. Walker says, "Tin is a metal which, like copper, accelerates the corrosion of iron by aiding in the oxidation of the hydrogen set free by the reaction." M. P. Wood calls attention to the injurious action of metals, "The use of anti-corrosive or anti-fouling paints, containing salts of any metal, is attended with the greatest danger to the coated (iron or steel) structure. These pigments are extremely sensitive to the presence of saline elements in moisture, their action being to rapidly dissolve portions of the iron and to deposit the metal which they contain upon the surface of the plates, and these deposits, exciting energetic galvanic action, cause corrosion and pitting to go on with alarming rapidity. Both mercury and copper salts are offenders in this way."

#### Arsenic Unique in Completely Protecting Iron

It appears, then, that arsenic is unique among the metals which precipitate themselves upon iron from solution, for arsenic protects iron almost completely from powerful corrosive agents, while the other metals are generally considered to aggravate corrosion and rusting. The protective action of arsenic cannot be due to any superior power of resisting attack by sulphuric acid, for silver, platinum and gold are even more resistant, and yet accelerate the corrosion of iron. It is evident that these other metals do not form continuous and impervious coatings over the iron, else they would protect it. It is difficult, perhaps even impossible, even with the aid of the electric current, to deposit from solution a thin coating of one metal upon another so perfectly as to protect the underlying metal from corrosion by an acid ordinarily capable of attacking it.

It is almost incredible that a thin, yet perfect and non-porous, metallic coating should be deposited by a process which depends for its operation upon the dissolving of the underlying metal. The protective action of coatings of copper, silver, etc., thus deposited on iron is about as effective as would be expected from a knowledge of their method of formation. They are continually being undermined by the corroding of iron anode at points not yet covered, until the copper or silver becomes detached, to

have its place taken by a new coating, and so on, as long as any of the salt of the depositing metal remains in the solution. If the coated metal be removed to an acid, the corrosive action is similar, except that the renewal of the coating can take place only at a rate not greater than that at which the detached metal redissolves in the acid.

#### Why Arsenic Protects Iron So Well

If the coating of arsenic is so porous and imperfect as the action of acids shows the coating of copper, for example, to be, how can the arsenic protect the iron any better than copper does? It occurred to the writer that the explanation lay in a high overvoltage or excess potential of hydrogen on arsenic, and the experiments which follow were undertaken to discover whether this is the explanation of the singular and mysterious protective action of arsenic. If the above explanation is correct, among the metals which deposit upon iron when it is immersed in a solution of their salts those having a high overvoltage for hydrogen should protect iron, and those of very low overvoltage should aggravate corrosion.

If an electrode of platinum coated with platinum-black be immersed in normal sulphuric acid the electrode will be electro-negative to the solution by about 1.14 volts. If now a small but slowly increasing electromotive force be applied between this electrode and an insoluble anode it will be found that the platinized cathode becomes progressively electronegative with regard to the solution. When a certain difference of potential between the cathode and the solution is reached, bubbles of hydrogen begin to appear on the cathode. If a cathode of smooth platinum is used, hydrogen will not appear on this until it has become 0.09 volts more positive than the other cathode was when hydrogen first appeared on it. Similarly zinc must be 0.70 and mercury 0.78 volt more positive than the platinum-black before hydrogen appears upon them. This excess of potential required to cause a visible liberation of hydrogen upon a cathode of any particular metal, over the potential required for the liberation of hydrogen upon platinum coated with platinum-black, is known as the overvoltage of hydrogen upon that metal. In Table I are given the single potentials in normal solutions of the sulphates of the metals, and the overvoltage of hydrogen as stated by different observers.

Table I—Single Potentials in Normal Solutions of Sulphates of the Metal and Overvoltage of Hydrogen.

|                | Single potential | Overvoltage in 1 cent. KOH. |                     |         |                |
|----------------|------------------|-----------------------------|---------------------|---------|----------------|
|                |                  | normal sulphuric acid—      | In 5 per cent. KOH. |         |                |
|                |                  | Caspari                     | Foerster            | Harkins | Nutton and Law |
| Mercury .....  | -0.98            | 0.78                        | 0.43                | 0.74    | ...            |
| Zinc .....     | +0.524           | 0.70                        | ...                 | 0.71    | 0.70           |
| Lead .....     | -0.095           | 0.64                        | 0.35                | 0.62    | 0.57           |
| Tin .....      | -0.085           | 0.53                        | 0.43                | 0.55    | 0.61           |
| Cadmium .....  | +0.162           | 0.48                        | 0.48                | ...     | 0.52           |
| Arsenic .....  | -0.550           | ...                         | ...                 | 0.39    | ...            |
| Bismuth .....  | -0.490           | ...                         | ...                 | 0.38    | ...            |
| Iron .....     | +0.093           | ...                         | ...                 | ...     | 0.15           |
| Copper .....   | -0.515           | 0.23                        | 0.10                | 0.25    | 0.41           |
| Cobalt .....   | -0.019           | ...                         | ...                 | 0.22    | ...            |
| Nickel .....   | -0.022           | 0.21                        | 0.10                | 0.15    | 0.37           |
| Silver .....   | -0.947           | 0.15                        | ...                 | 0.13    | ...            |
| Platinum ..... | -1.140           | 0.09                        | 0.07                | 0.07    | ...            |
| Gold .....     | -1.356           | 0.02                        | 0.055               | ...     | ...            |

On the theory that the protection of iron by a deposit of arsenic is due to the high overvoltage of hydrogen on the latter the action would be as follows: Iron dissolves and by so doing deposits arsenic upon the surface of the iron. Since the arsenic is deposited simultaneously with the dissolving of the iron, and only as a result of this dissolving, it is hardly possible that the iron should be perfectly covered by arsenic, but here and there holes will exist, allowing the iron, to make contact with the electrolyte. Voltaic cells are thus formed. From the single potentials of iron and of arsenic, +0.093 and -0.550, these cells should have an electromotive force of 0.64 volts, and the corrosion of the iron ought to be very vigorous. It is here that the overvoltage of hydrogen comes in play. The iron is anode and the arsenic cathode, and, just as in any other primary cell with sulphuric acid as electrolyte, hydrogen is deposited on the cathode. But when hydrogen is liberated on arsenic the potential of the latter is raised 0.39 volts higher than -0.277, the potential at which hydrogen is liberated on platinum-black. This would raise the potential of the arsenic to +0.13 volts, or higher than the potential of the iron anode. This means that in our iron-arsenic cell there can be no visible evolu-

\*Presented before the American Electrochemical Society, in Boston, Mass., April 18-20.

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tion of hydrogen on the arsenic, for before this can occur the potential of the cathode has become equal to that of the anode, and corrosion of the iron ceases; in other words, this particular primary cell polarizes so badly that after a few seconds of action its electromotive force has fallen to zero.

If the above explanation is correct, protection should be afforded by those metals which plate out on iron by immersion, and whose overvoltage for hydrogen is great enough to raise their potentials to at least equal the single potential of iron. The potentials of the following metals are far enough below that of iron to expect that they will deposit on iron even in moderately strong sulphuric acid: Antimony, arsenic, bismuth, gold, lead, mercury, platinum, silver and tin. Potential measurements made by students in the writer's laboratory indicate that chromium should be included in the list. Omitting lead, on account of the insolubility of its sulphate, mercury, tin and arsenic show the highest overvoltage; compounds of these metals were therefore used in a preliminary experiment by A. C. Shape.

[Results of a number of tests are here given in which pieces of No. 22 mild sheet steel, 5 centimeters square, were pickled in sulphuric acid to remove the scale, dried, weighed and corroded in sulphuric acid to which three volumes of water had been added. Reagents were then added to test the protection given by tin, arsenic, mercury, chrome, antimony, bismuth, copper.]

From the experiments given, certain definite conclusions can be drawn and other generalizations now appear probable, but may require revision or rejection in the light of future experiments.

The writer's hypothesis, that the protective action of arsenic is due to its high overvoltage, has been in a general way confirmed. Other metals of high overvoltage have had a protective influence, while all metals of low overvoltage which deposit on iron are accelerators of its corrosion. So far as overvoltages are known, bismuth alone fails to conform to the hypothesis. Theoretically it should retard corrosion; actually it is an accelerator. Unless redeterminations of the overvoltage of bismuth and the single potential of iron shall reconcile theory with fact, the writer's hypothesis fails. The overvoltage of bismuth was presumably measured on a solid electrode. Bismuth deposited as a powder. If there is the same difference in overvoltage for bismuth as between smooth and spongy platinum, this correction would put bismuth in the list of accelerators.

The statements which follow are intended to apply only to the corrosion of iron by sulphuric acid. Tin, chromium and mercury retard corrosion; of these, tin alone is as effective as arsenic. The protective action of mercury is very slight. Oxidizing agents are in themselves accelerators of corrosion by acids, although in dilute solution this may be masked by a protective action which supervenes when the oxygen has been used up, as might happen with chromates.

Reducing agents should show more or less protective action, but this fact remains to be confirmed by further experiment.

In general, the whole subject as here presented is but a preliminary study which opens many possibilities for future investigation.

### Increase in Pig Iron Melt Since January

Matthew Addy & Co., Cincinnati, say in their pig iron market review of May 25: "As a rule, we should say that the melters of iron are about 20 per cent. busier than was the case in January. It is particularly gratifying to note much more business from the railroads. The concerns making equipment for the railroads have had a hard and rocky road for 10 of these many months; but they are finding easier going these days, for the railroads are buying rails, cars, wheels, etc. The pipe shops are running full. In fact, every one has more orders in hand and is feeling that the tide surely has turned."

Through an inadvertence the halftone in the description of the new No. 15 overhead drilling machine built by Boynton & Plummer, Inc., Worcester, Mass., which appeared on page 1292 of *The Iron Age* of May 23, was turned upside down. This was apparent to the practical reader.

### New American Members of the Iron and Steel Institute

An unusual number of representatives of the iron and steel industry of the United States were elected to membership at the meeting of the Iron and Steel Institute held in London, May 9 and 10. The list includes the following:

R. R. Abbott, metallurgical engineer, Peerless Motor Car Company, Cleveland, Ohio.

C. T. Dawkins, blast furnace chemist and metallurgist, Lake Superior Iron & Chemical Company, Ashland, Wis.

G. S. Falk, steel casting manufacturer, Milwaukee, Wis.

H. G. Kiefer, chemist and metallurgist, Timken Roller Bearing Company, Canton, Ohio.

G. C. Moon, wire rope manufacturer, Cranford, N. J.

R. Ortmann, president Ajax Forge Company, Chicago.

J. H. Parker, metallurgist, Carpenter Steel Company, Reading, Pa.

R. J. Snyder, general manager bolt and nut works, Greenwich, Conn.

H. P. Tiemann, metallurgist, Carnegie Steel Company, Pittsburgh.

The meeting was unusually well attended and at the annual dinner there were over 400 guests. The report of the council showed that in the past year 102 new members had been elected and that the membership on December 31, 1911, was 2133.

The meeting was of particular interest in that following the two years' presidency of the Duke of Devonshire a representative of the iron industry was elected to that office in the person of Arthur Cooper, general manager of the North Eastern Steel Company, Middlesbrough, England. He has been a member of the Institute for 38 years and was awarded the Bessemer gold medal in 1892 for his work in connection with the development of the basic open hearth process. On taking the chair Mr. Cooper's first act was the announcement that the Bessemer gold medal for 1912 had been awarded to John Henry Darby, who was not able to be present to receive it. Mr. Darby superintended at Brymbo the erection of the first large plant of basic open hearth furnaces in Great Britain. He was also associated with the introduction into Great Britain of by-product coke ovens. Another event was the presentation of the Carnegie gold medal to Dr. Paul Goerns, of Aix-la-Chapelle. The Andrew Carnegie scholarship awards were made to Arthur Kessner, Berlin; Eugene Nusbaumer, Belgium, and J. Allen Pickard, of Woolwich Arsenal. A similar award had been made to Walter S. Landis, formerly of Lehigh University, South Bethlehem, Pa., but Mr. Landis had left the university and therefore declined to accept the award.

Among those who made responses at the annual dinner were Dr. E. Schrödter, Düsseldorf, Germany, general manager of the Verein Deutscher Eisenhüttenleute, Düsseldorf, and A. Greiner of the Cockerill Works, Seraing, Belgium.

Mr. Cooper in his presidential address gave a review of progress in the metallurgy of iron and steel in the past forty years. In conclusion he expressed the belief that "the day is close at hand when in the best-managed large works, equipped with modern by-product coke ovens and blast furnaces, the whole of the converting, heating, rolling, and finishing operations will be carried out with no other fuel than their own surplus gases, and if any of us fail to utilize our resources to the fullest extent, unless exceptionally situated, we may be left behind in the race."

At the convention of the National Gas Association held in Kansas City, Mo., the past week the consensus of opinion was that the Kansas natural gas field is within three or four years of exhaustion and will not even last for this period if the supply is not guarded by an increase in price to small consumers and its consequent effect on consumption. This situation will have a strong bearing on the operation of smelters and other plants using gas as fuel, of which there are many depending on the Kansas field.

The National Lightning Rod Manufacturers' Association was formed at a meeting held in St. Louis the past week, H. F. Kretzer of St. Louis being chosen temporary president. More than two-thirds of the lightning rod manufacturers of the United States attended the meeting.

# The Steel Corporation Dissolution Suit

Percival Roberts, Jr., and C. D. Marshall Testify Regarding Bridge Companies—C. P. Perin Again Gives Facts Concerning Tennessee Company—Robert Stevenson, Jr., the Builder of Numerous Steel Plants Sold to the Corporation, Gives Interesting Testimony

## Testimony of Percival Roberts, Jr.

Continuing the narration of proceedings before the special examiner, Henry P. Brown, in the Custom House, New York, the greater portion of the session on Tuesday, May 21, was taken up with the testimony of Percival Roberts, Jr., now a director and a member of the Finance Committee of the United States Steel Corporation and president of the American Bridge Company at the time it was absorbed by the corporation. Mr. Roberts said that no negotiations were held with the officers or directors of the bridge company but that J. P. Morgan & Co. simply sent out a circular announcing the basis on which they were willing to exchange the stocks of the two corporations. "All I had to do with the transfer," he said, "was to exchange my stock in the bridge company for the shares of the Steel Corporation."

R. V. Lindabury, counsel for the defendants, drew from Mr. Roberts the fact that he was a large stockholder in the American Bridge Company, and that he had had an earlier talk with Mr. Steele of Morgan & Co. "Mr. Steele talked to me individually," he said, "and told me that the exchange would be made on the basis of 110 in Steel Corporation preferred for 100 of American Bridge preferred and 105 common for 100 American Bridge common. He asked for my views and I said the arrangement was satisfactory to me. There were no negotiations with the American Bridge Company as a corporation or with its officers officially."

## EXPERIENCE WITH POOLS

He was next asked about pools in structural steel and whether they were not in existence before 1900. He replied:

"For many years before 1900 there were associations of manufacturers in the nature of profit-sharing arrangements. They were usually the result of destructive competition, which had brought prices to a point below the cost of manufacture. As the market improved the agreements generally fell to pieces or became of little value. They were the creation of price conditions, and in many cases died a natural death."

"Were they in many cases ineffective?"

"No, I think they were generally effective. Their break down was generally due to a change of conditions which made them top-heavy. There was a division of profits where some sold more than their allotments, and others less than theirs. As conditions changed these allotments became unsatisfactory to certain companies and the agreements broke down. I never knew an agreement to fail because of price-cutting alone."

## COMBINATION OF OTHER STRUCTURAL FABRICATORS CONSIDERED

Judge Dickinson read from the minutes of a meeting of the directors of the Steel Corporation in May, 1901, an extract in regard to a proposal to combine all the manufacturers of bridge and structural steel outside of the American Bridge Company into a single corporation. President Schwab, it appeared, thought the scheme would work well for the American Bridge Company, as it would have only one outsider to deal with instead of a large number. Mr. Roberts, to whom the matter was referred, decided to do nothing about it, saying that the outsiders did not amount to much in a competitive way, but if they were united they might become more formidable.

Mr. Roberts admitted that the minutes were correct, except that the proposition was not to combine all the outsiders, but only part of them.

Judge Dickinson then read from the minutes of a meeting of the American Bridge Company in May, 1900, at which the president stated that I. Gifford Ladd, who was active in the organization of the American Bridge Company, found that he was unable to deliver certain plants that were to have come in, namely, the Bellefontaine Bridge Company, Canton Bridge Company, Chicago Bridge Company, J. B. Cornell, New Jersey Steel & Iron Company, Passaic Rolling Mill, Penn Bridge Company, Toledo Bridge Company and Wisconsin Iron Company. The Govern-

ment's purpose in bringing out the names of these other concerns was to show that it was the intention of the men who organized the American Bridge Company to take in all the big plants and create a monopoly. It developed, however, that this meeting was held before Mr. Roberts was connected with the American Bridge Company, so he couldn't say whether these companies were to have been taken in or not.

Judge Dickinson then read a contract by which the American Bridge Company agreed to buy at least 51 per cent. of its materials from the Carnegie Steel Company, and the latter agreed not to sell bridge or structural material. There was a provision that if the Bridge Company should not control two-thirds of the business of the country in bridges, viaducts, elevated railroads, etc., the Carnegie Company could resume business in those lines. Mr. Roberts admitted that the contract was authentic.

On cross-examination Mr. Roberts said that the American Bridge Company controlled about 38 per cent. of the country's business in 1903, but now controlled only 32 per cent. The amount had increased, but the independents had grown faster. "We never had a monopoly in any sense of the word," he said. "The whole scheme was to reduce the cost of production. A great change took place in the structural steel business between 1893 and 1900, owing to the building of skyscrapers on a large scale, and this made it impossible for small concerns to handle the business. It made consolidation necessary."

## More Testimony About Pools

John C. Langan, formerly secretary to W. C. Temple, commissioner of pools in steel sheets, steel plates, steel shafting and structural steel between 1902 and 1906, told how these associations operated. They were along the same lines as the Jackson pools in wire products.

## C. D. Marshall's Testimony

Impressive figures of the business done by the McClintic-Marshall Construction Company, a competitor in bridge construction work of the United States Steel Corporation, were brought out at the next day's hearing. C. D. Marshall, president of the company, was closely questioned by counsel for the defense with a view to showing that the Steel Corporation has nothing like a monopoly of the steel bridge construction work in the country. Under their handling Mr. Marshall proved to be a better witness for the defense than for the Government.

## THE GROWTH OF AN INDEPENDENT COMPANY

When Mr. Marshall was taken in hand by C. A. Severance, of counsel for the defense, he said his company's business had grown from 52,000 tons in 1902 to 133,000 tons in 1910. He had testified previously, however, that his company had increased its capital from \$10,000 to \$3,500,000. He said that the added capital did not represent earnings, but "came from the outside." In answer to Mr. Severance's questions the witness said his company did business with many railroad companies. He recited a list of more than 18 of the principal lines of the country.

"Well," remarked Mr. Severance, "the American Bridge Company doesn't seem to have been able to put you out of business."

"Not on these particular roads," replied Mr. Marshall.

He also testified under questioning by the Steel Corporation lawyer, that his company is building the Panama Canal lockgates weighing 60,000 tons in all, and that it got the job in open competition with the American Bridge Company.

Mr. Severance called the witness's attention to the fact that the New Haven and New York Central roads, for which he had built bridges, had "interlocking directors" with the Steel Corporation.



"Did that fact interfere with your getting these contracts?" he asked.

"Not that I know of," answered Mr. Marshall.

On his direct testimony Mr. Marshall said that various subsidiaries of the American Bridge Company were active competitors for interstate trade prior to consolidation. The most important firms that did not enter into the combination are the Pennsylvania Steel Company, Phoenix Bridge Company and King Bridge Company, he said. Mr. Marshall gave as his opinion that the American Bridge Company contracted during the past year for 70 per cent. of all the bridge steel work in the United States. He said he based his figures on the month to month reports, which he examined closely. He testified further that as far as he could judge the American Bridge Company at the time of its formation was supplying fully 75 per cent of the country's fabricated steel. He stated that the Carnegie Steel Company and the American Tinplate Company were customers of his until the Steel Corporation was formed. Since then their orders have gone to the American Bridge Company.

Further questioning brought out that the Pennsylvania Steel Company, an independent largely controlled by the Pennsylvania Railroad, had bid against his company for work on that line.

"You beat them in competition for work on their own road?" asked Mr. Severance.

"Yes," answered the witness. "If everybody did business the way the Pennsylvania Railroad does, we would have no complaint."

Mr. Marshall said his company had never been in a pool of which the American Bridge Company was a member, and that it was not a member of the American Bridge Builders' Society.

#### Charles P. Perin Examined

On Wednesday and Thursday Charles Page Perin, consulting engineer, New York City, who has made a specialty of coal and iron properties, told of an examination of the Tennessee Coal, Iron & Railroad Company's holdings, made in 1904 by a commission of which he was a member. At the same time an examination was made of the properties of the Sloss-Sheffield Steel & Iron Company and the Republic Iron & Steel Company in the Birmingham district. A merger of the three companies was in contemplation at that time, but fell through.

The Government contends that the acquisition of the Tennessee Company by the Steel Corporation gave it a practical monopoly of the iron ore of the country, and Mr. Perin's testimony was to show how extensive were the holdings of the Tennessee Company and the proximity of its coal, iron and limestone deposits, enabling it to make pig iron more cheaply than at any other place. Mr. Perin gave similar testimony before the Stanley committee. On this occasion he said:

"There is no other juxtaposition of coal, iron and limestone like that on the Tennessee Company's property anywhere else in the world. There is no other section where pig iron can be made so cheap as in the Birmingham district. With inferior machinery it could be produced by the Tennessee Company \$4 a ton less than at Pittsburgh."

Mr. Perin said that in 1906 he estimated that it would cost about \$20,000,000 to bring the Tennessee Company up to the Northern standard. Since the Steel Corporation took over the company it has introduced by-product coke ovens, saving 20 per cent. in coal over the old bee-hive process, thus economizing on the coal resources. Also the coal-crushing process has saved fuel. He said that labor welfare and conditions generally have been greatly benefited by the acquisition of the company by the Steel Corporation. Mr. Reed asked:

"Would you consider the advent of the Steel Corporation in the Birmingham district has proved a benefit to that territory?"

"A very great blessing to the district and to the iron industry generally," answered Mr. Perin.

Mr. Perin detailed a number of benefits which the Steel Corporation, with the expenditure of vast amounts of money, has conferred upon the business of the region.

"But," demanded Judge Dickinson, counsel for the Government, "wasn't this money spent with profits in view?"

The witness smiled. "Oh, I don't think their motives were entirely eleemosynary."

"Would not the same amount of money spent by any one else have produced exactly the same results?"

"No other company could have put in the money," replied Mr. Perin, "because there were no profits from the Tennessee Company to cover any such outlay."

#### John Stevenson, Jr., On the Stand

Following Mr. Perin, on Thursday and Friday, came John Stevenson, Jr., now manufacturing automobile parts at Sharon, Pa. Mr. Stevenson was at one time a very prominent steel manufacturer, first in the wire trade, then in tinplate and again in wire. He got his business training with Mackintosh, Hemphill & Co. and Carnegie, Phipps & Co., then built the New Castle Wire Nail Company's plant at New Castle, next the Shenango Valley Steel Company's plant at the same place, next the New Castle Steel & Tin Plate Company's plant, then the Sharon Steel Company's plant at Sharon and next the Sharon Sheet Steel Company's plant.

#### MR. STEVENSON'S FIRST SALE OF A PLANT

Mr. Stevenson's examination was conducted at great length, as he had had so much experience in building steel plants and selling them to consolidations. His first deal in this direction was when he sold the New Castle Wire Nail Company to the Consolidated Steel & Wire Company, which had just been organized by John W. Gates. Recalling his connection with the wire trade, he told of wire nail pools in the old days and how members broke their agreements a few minutes after signing them. Describing the circumstances attending the sale to John W. Gates, he said:

"I met him on a train between stations a few miles apart. He said I had better surrender, and I surrendered. That's what I did. We had all been fighting each other so long that out of 46 wire mills in the country only 11 were left. Gates combined four of these in his company, and that left seven. When I went in there were only two outside of the combination. I mean the companies that were really making nails. There were a few others, but they didn't amount to anything."

"In what period did the number of wire mills run down from 46 to 11?"

"It was mostly in Cleveland's Administration," said Mr. Stevenson, who also testified that his first mill blew down on the night of a meeting to ratify Cleveland's nomination.

Organizing the Shenango Valley Steel Corporation, he sold off its tin plate mills to the American Tin Plate Company.

"By the time I sold out to Judge Moore I had 50 tin plate mills, the biggest plant in the world. There were then about 160 to 200 mills in the whole country. There were too many in the business for the demand. Trade was demoralized, and some of them were in serious difficulties. They went to Judge Moore and asked him to get up a combination. I gave Judge Moore an option on my mills at \$1,000,000. My share of this amounted \$357,000."

"That was to be paid in either cash or stock, wasn't it?"

"Well, I always 'had me doots' about the cash. It was stock I got, \$357,000 each of common and preferred. I should say the understanding was that we would get cash if Judge Moore could raise the money."

Mr. Stevenson also had a small tube plant, which he sold to the Shelby Tube Company, afterward absorbed by the National Tube Company, which in turn went into the Steel Corporation.

"After you had disposed of the tinplate, wire and tube mills, what did you do?"

"I still had my steel mills, so I cultivated very friendly relations with John Gates and his partner, John Lambert, and sold them billets. After about a year I sold out to the National Steel Company. We were capitalized for \$1,000,000 and we got \$3,300,000. We sold to the same old crowd that kept bobbing up—Judge Moore, Daniel G. Reid, Leeds, Henry Wick, and a lot of others. There were more than 100 stockholders, I guess."

"What did you do then?"

"I hadn't anything more to sell, so I went abroad. When I came back I found many manufacturers anxious. They were kind of afraid the Lord wouldn't take care of them and wanted to get under the shelter of the combinations. I didn't feel that way, and went to building tinplate, rod, and wire mills at Sharon. We'll 'shake the apple tree again,' I told my associates. In 1897 Judge Moore wanted to buy out my new tinplate plant. I met Graham, Gates, Moore and Warner Arms in New York. I told them I didn't want to sell this time, but wanted a percentage of the business allotted to me."

"You see, I was getting along in years and wanted something to occupy me and keep me out of mischief. So I offered to take 10 per cent. of the business and agreed to make the same prices they did. It was a perfectly fair proposition and we agreed on it. The

contract was for 10 years, and it only continued for 18 months. In the first year we made 37 1/4 per cent. on our capitalization and the other six months we did pretty well, too.

"The Sharon Steel Company owned a controlling interest in the Sharon Tinplate Company, and the other fellows wanted the tinplate plant. It was either fight or surrender, and I thought best to surrender. So I sold out, and that was the end of the contract."

The Sharon Steel Company continued to make wire and nails in competition with the American Steel & Wire Company. The market boomed and there was "enough for everybody and to spare." Then came the merger of the Sharon Steel Company with the Union Steel Company. When the Sharon and Union Steel companies were merged the Union sold out to the Steel Corporation.

"What share did you get?" Mr. Stevenson was asked.

"I didn't get shares. I got bonds this time. It was the poorest deal I ever made. In others there was an element of gambling, when we got common stock with the hope that it would go up. This time I just got my profits, that's all. The bonds that went to pay for the Sharon works amounted to \$13,200,000. The capacity of the plant was 350,000 tons."

"Did you encounter any unfair competition from the Steel Corporation from the time it was formed until you sold out to it?" asked Mr. Lindabury.

"Not at all. Frank Baackes and that crowd had been up to some tricks, but they had all got religion by that time."

After replies to questions put by Henry E. Colton, one of the Government attorneys, had shown that the Sharon Steel Company needed money and that it was only after a failure to sell a bond issue that it sold out, Mr. Lindabury asked Mr. Stevenson if the company was at that time in danger of a receivership.

"Oh, we hadn't got as bad as that," replied the witness. "I think half of the companies I know have been threatened with bankruptcy at one time or another."

"There was no unfair competition," Mr. Stevenson went on. "Business was booming between 1901 and 1903, and we could all sell our output at fair prices. When we sold out we got \$5,000,000 for our ore lands, which had cost us much less. They were a lucky find."

"Was that a good price for the ore lands?"

"Well, if we had had a million or two the Steel Corporation wouldn't have got them at any price. They got a bargain."

"Were you able to develop any foreign trade before you sold out?"

"No. The Steel Corporation is the only American concern that has been able to develop any export business to amount to anything. The smaller companies could not maintain the necessary organization to keep in touch with foreign markets."

"Then when you sold out each time there was nothing in the agreement to keep you from going into business again?"

"No, they never tried to keep me out of the business. They didn't try any suppression on me."

#### Percival Roberts, Jr., Recalled

Proceedings were resumed on Monday, May 27, by the recalling of Percival Roberts, Jr., for further examination in regard to the percentage of the country's structural business controlled by the American Bridge Company. Mr. Dickinson, for the Government, assailed the figures by which Mr. Roberts had tried to show that the American Bridge Company controlled only 38 per cent. of the country's business in bridge and structural material at its formation, and only 32 per cent. now. C. D. Marshall, president McClintic-Marshall Construction Company, largest of the independents in this line, had put the figures at 75 and 70 per cent., respectively.

Mr. Roberts stated that the American Bridge Company got statistics every month as to the output of the independent bridge companies, which made it possible to arrive at the proportions of the independents and of the American Company. This was kept up till 1911, he said, and was one of the sources from which he reached his conclusions. When he was asked where these figures came from he was unable to tell. They passed through a number of hands, he said, before they were collated. He produced several of the lists and said they had been prepared for him in the auditing department of the Steel Cor-

poration, but just where the information came from on which they were based he did not know.

When this testimony was finished Mr. Dickinson gave notice that he would ask to have it stricken out when both parties go before the Circuit Court in Philadelphia to have their accumulated differences ruled on, his ground being that Mr. Roberts's testimony is based on no first-hand knowledge of the facts.

#### George W. K. Taylor, Pipe Jobber, Testifies

George W. K. Taylor, of McMann & Taylor, New York, jobbers in pipe and fittings, testified that most of the companies which were combined into the National Tube Company formerly had been in competition. The defense contends that this subsidiary of the Steel Corporation controls only 38 per cent. of the business in its field, and Mr. Taylor testified that, although he could not say that this was the exact percentage, it was a fact that the National Tube Company has not as large a percentage as when it was organized, and that the independent manufacturers have more than half of the business.

Contracts between his firm and the National Tube Company were introduced to show that rebates were made on about the same basis as was the case with the American Sheet & Tinplate Company. His firm bound itself to take from 80 to 90 per cent. of its requirements from the National Tube Company, and in consideration of this it received a discount of one-half of 1 per cent. on the published prices. This was originally deducted in billing, he said, but afterward bills were made out at the full price, which were paid, after which his firm received a check for the difference. This whole discount practice, he said, was abandoned in 1905.

At the termination of Monday's session the hearings were suspended for the present. Some time will be spent by counsel for both sides in going over documents and records of the Steel Corporation and its subsidiaries, which the Government wishes to introduce in evidence. Instead of meeting the objections of counsel for the defense as each paper or set of papers is offered, it has been arranged that counsel shall agree in advance, so far as possible, on the introduction of papers to which the defense has no objection, and it is probable that these will be introduced in bulk, so that witnesses can be examined concerning them as they are called.

#### The Exhaustion of Connellsville Coking Coal

The Connellsville Courier of May 23 publishes an article by John W. Boileau, who states that in the ten-year period from 1901 to 1910 there was produced in the Connellsville regions 156,000,000 tons of coke. With the present oven capacity as a base, and with an increase in production per annum placed at 5 per cent., he predicts that there will not be an acre of Connellsville coking coal remaining in either of the Connellsville regions in 1930. The data at hand show rapid exhaustion. The argument is made that it is time that coke producers were insisting upon a fair return and a substantial profit. He says that "it is time the coke interests were realizing the necessity of closer co-operation, to the end that the coke industry shall either secure a good price for its output or leave its incomparable coking coal in the hill, where an increased future value will steadily accrue."

#### Foundry Fire Protection and Insurance

At the meeting of the New England Foundrymen's Association in Hartford, Conn., May 8, a committee was appointed to look into better fire protection and insurance rates for foundry properties. The chairman is Bartlett M. Shaw, Walker-Pratt Mfg. Company; the other members are George P. Aborn, Blake & Knowles Steam Pump Company, and Henry A. Carpenter, of Providence, R. I. Both Mr. Shaw and Mr. Carpenter are past presidents of the association. It is the intention of this committee to study the whole subject of fire protection in foundries, with particular reference to improving conditions and thus securing better insurance rates. The main object, however, has actual saving of property back of it rather than a mere adjustment of rates, for it is realized that the true purpose of any such study is to make possible a reduction in the destruction by fire of created properties.



# Pig Iron Prices at Cincinnati and Chicago

A Record of 36 Years on Southern Foundry Iron at Cincinnati and 24 Years on Local Iron at Chicago

So much interest is being taken in statistics of prices for a long series of years that we have no doubt many of our readers will attach much value to the tables given below, showing average monthly prices of No. 2 Southern foundry pig iron at Cincinnati from 1876 to 1911, inclusive, and No. 2 local foundry pig iron at Chicago from 1888 to 1911, inclusive. These prices are averaged from weekly quotations in the market reports of *The Iron Age*.

Southern No. 2 Foundry Pig Iron at Cincinnati, per Gross Ton.

|                 | 1876    | 1877    | 1878    | 1879    | 1880    | 1881    | 1882    | 1883     | 1884    | 1885    | 1886    | 1887    |
|-----------------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|---------|---------|
| January .....   | \$22.00 | \$20.00 | \$18.00 | \$17.10 | \$37.75 | \$22.50 | \$25.50 | \$21.62½ | \$17.25 | \$15.62 | \$17.00 | \$20.12 |
| February .....  | 22.00   | 20.25   | 18.00   | 17.75   | 41.12½  | 22.50   | 25.50   | 21.50    | 17.00   | 15.25   | 17.00   | 21.00   |
| March .....     | 22.00   | 20.40   | 17.62½  | 18.00   | 38.12½  | 22.50   | 24.90   | 20.60    | 17.75   | 14.62   | 17.00   | 21.00   |
| April .....     | 22.00   | 20.50   | 17.75   | 18.00   | 33.50   | 22.50   | 23.50   | 20.62½   | 17.87   | 15.15   | 17.00   | 21.00   |
| May .....       | 22.00   | 20.20   | 17.00   | 18.00   | 26.25   | 22.25   | 23.00   | 20.25    | 17.25   | 15.00   | 16.37   | 20.50   |
| June .....      | 20.00   | 20.25   | 16.25   | 17.75   | 23.25   | 22.00   | 22.00   | 19.50    | 17.25   | 15.25   | 16.12   | 19.40   |
| July .....      | 20.00   | 19.25   | 16.00   | 17.75   | 22.60   | 21.50   | 22.25   | 19.00    | 16.62   | 14.81   | 15.37   | 19.50   |
| August .....    | 20.00   | 18.00   | 16.20   | 19.50   | 24.00   | 21.50   | 22.60   | 18.50    | 16.00   | 14.87   | 15.25   | 20.00   |
| September ..... | 19.50   | 18.00   | 16.75   | 25.50   | 24.00   | 21.75   | 22.62½  | 18.50    | 15.87   | 15.00   | 16.75   | 20.00   |
| October .....   | 19.50   | 18.00   | 17.00   | 33.50   | 23.50   | 22.00   | 22.37½  | 18.50    | 16.25   | 15.00   | 17.00   | 19.75   |
| November .....  | 20.00   | 18.00   | 17.00   | 36.00   | 22.00   | 24.50   | 22.00   | 18.50    | 16.18   | 15.50   | 17.75   | 19.50   |
| December .....  | 20.10   | 18.00   | 17.00   | 35.00   | 22.25   | 25.00   | 22.00   | 18.37½   | 16.25   | 16.37   | 18.60   | 18.87   |

|                 | 1888  | 1889  | 1890  | 1891  | 1892  | 1893  | 1894  | 1895  | 1896  | 1897  | 1898 | 1899  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| January .....   | 18.62 | 14.75 | 18.05 | 13.81 | 13.75 | 12.50 | 11.00 | 9.25  | 11.20 | 11.00 | 9.50 | 10.31 |
| February .....  | 19.00 | 14.37 | 17.75 | 13.75 | 13.62 | 12.12 | 10.75 | 9.25  | 11.00 | 9.75  | 9.25 | 11.69 |
| March .....     | 18.50 | 14.50 | 16.00 | 14.00 | 13.10 | 12.00 | 10.20 | 9.25  | 10.75 | 9.69  | 9.25 | 13.75 |
| April .....     | 17.75 | 14.25 | 14.31 | 13.75 | 13.00 | 11.75 | 9.50  | 9.25  | 10.40 | 9.25  | 9.25 | 14.50 |
| May .....       | 16.75 | 14.00 | 14.25 | 14.00 | 12.81 | 11.68 | 9.50  | 9.50  | 10.50 | 8.75  | 9.37 | 14.56 |
| June .....      | 15.75 | 13.68 | 14.75 | 13.75 | 12.81 | 11.50 | 9.61  | 10.12 | 10.32 | 8.75  | 9.30 | 16.00 |
| July .....      | 15.50 | 14.12 | 14.75 | 13.75 | 12.40 | 11.37 | 9.75  | 11.50 | 9.75  | 8.95  | 9.25 | 17.56 |
| August .....    | 15.80 | 14.50 | 14.75 | 13.50 | 12.17 | 11.05 | 9.80  | 11.50 | 9.37  | 9.00  | 9.37 | 18.35 |
| September ..... | 16.50 | 14.50 | 14.25 | 13.50 | 12.00 | 10.75 | 10.00 | 12.75 | 9.50  | 9.35  | 9.55 | 19.94 |
| October .....   | 16.50 | 15.31 | 14.25 | 13.75 | 12.25 | 10.75 | 10.00 | 12.75 | 9.95  | 9.50  | 9.75 | 20.75 |
| November .....  | 15.65 | 16.62 | 14.25 | 14.00 | 12.50 | 10.75 | 9.75  | 12.75 | 10.44 | 9.50  | 9.75 | 20.75 |
| December .....  | 15.50 | 17.56 | 14.00 | 13.75 | 12.50 | 10.87 | 9.25  | 12.50 | 10.35 | 9.50  | 9.90 | 20.75 |

|                 | 1900  | 1901  | 1902  | 1903  | 1904  | 1905  | 1906  | 1907  | 1908  | 1909  | 1910  | 1911  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| January .....   | 20.69 | 13.45 | 14.55 | 21.65 | 12.37 | 16.25 | 16.75 | 26.00 | 16.15 | 16.25 | 17.25 | 14.25 |
| February .....  | 20.50 | 13.12 | 14.75 | 21.50 | 12.12 | 16.25 | 16.75 | 26.00 | 13.75 | 16.13 | 17.06 | 14.25 |
| March .....     | 20.30 | 14.00 | 14.75 | 21.37 | 12.10 | 16.25 | 16.65 | 26.00 | 15.50 | 15.05 | 16.30 | 14.25 |
| April .....     | 20.19 | 14.50 | 16.87 | 20.15 | 12.50 | 16.25 | 16.63 | 25.06 | 15.20 | 14.25 | 15.37 | 14.25 |
| May .....       | 19.75 | 13.85 | 18.35 | 18.87 | 12.25 | 15.81 | 16.75 | 24.23 | 14.75 | 14.50 | 15.00 | 13.95 |
| June .....      | 18.75 | 13.37 | 20.19 | 17.75 | 11.80 | 14.65 | 16.44 | 24.10 | 15.25 | 14.70 | 14.85 | 13.44 |
| July .....      | 16.81 | 13.00 | 20.75 | 16.15 | 11.81 | 13.94 | 16.06 | 23.85 | 15.00 | 15.75 | 14.75 | 13.25 |
| August .....    | 14.25 | 13.00 | 23.06 | 15.19 | 12.00 | 14.40 | 17.30 | 23.00 | 15.25 | 16.38 | 14.31 | 13.45 |
| September ..... | 13.62 | 13.06 | 25.00 | 14.75 | 12.00 | 14.37 | 18.69 | 21.50 | 15.65 | 17.35 | 14.25 | 13.31 |
| October .....   | 12.87 | 13.75 | 25.65 | 13.50 | 12.81 | 15.31 | 20.00 | 20.95 | 15.75 | 17.88 | 14.25 | 13.25 |
| November .....  | 12.95 | 14.00 | 23.62 | 12.00 | 15.19 | 16.60 | 23.38 | 19.50 | 16.00 | 17.75 | 14.25 | 13.20 |
| December .....  | 13.75 | 14.25 | 22.44 | 12.05 | 15.85 | 16.75 | 25.00 | 17.00 | 16.25 | 17.45 | 14.25 | 13.19 |

Local No. 2 Foundry Pig Iron at Chicago (at Furnace after 1897) per Gross Ton.

|                 | 1888  | 1889  | 1890  | 1891  | 1892  | 1893  | 1894  | 1895  | 1896  | 1897  | 1898  | 1899  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| January .....   | 19.00 | 16.00 | 19.50 | 14.60 | 14.50 | 13.37 | 12.50 | 9.75  | 13.55 | 11.02 | 11.35 | 11.47 |
| February .....  | 18.87 | 15.00 | 18.87 | 15.00 | 14.37 | 12.81 | 11.87 | 9.75  | 12.50 | 11.00 | 11.28 | 12.47 |
| March .....     | 18.12 | 15.00 | 17.62 | 15.00 | 14.00 | 13.00 | 11.30 | 9.81  | 12.00 | 10.88 | 11.10 | 14.95 |
| April .....     | 17.50 | 15.00 | 16.62 | 15.12 | 14.00 | 13.00 | 10.50 | 10.25 | 12.00 | 10.75 | 11.26 | 15.47 |
| May .....       | 17.00 | 15.00 | 16.20 | 15.00 | 14.00 | 12.96 | 10.50 | 10.25 | 11.69 | 10.38 | 11.35 | 15.72 |
| June .....      | 16.25 | 14.50 | 16.00 | 15.00 | 14.00 | 13.00 | 10.50 | 10.88 | 11.50 | 10.25 | 11.35 | 17.95 |
| July .....      | 16.00 | 14.87 | 16.00 | 15.15 | 14.00 | 12.79 | 10.12 | 12.13 | 11.25 | 10.25 | 11.35 | 19.22 |
| August .....    | 16.00 | 15.10 | 16.00 | 15.00 | 13.75 | 12.75 | 10.00 | 13.20 | 11.18 | 10.25 | 11.35 | 20.65 |
| September ..... | 16.50 | 15.50 | 16.00 | 15.00 | 13.50 | 12.75 | 10.00 | 13.63 | 10.75 | 10.40 | 11.35 | 22.22 |
| October .....   | 17.12 | 17.00 | 16.00 | 15.00 | 13.50 | 12.75 | 10.00 | 14.00 | 10.88 | 11.00 | 11.35 | 23.35 |
| November .....  | 17.00 | 17.62 | 15.75 | 14.94 | 13.50 | 12.75 | 9.70  | 14.00 | 11.19 | 11.00 | 11.35 | 23.45 |
| December .....  | 16.87 | 18.66 | 15.37 | 14.62 | 13.50 | 11.69 | 9.75  | 14.00 | 11.25 | 11.00 | 11.35 | 23.85 |

|                 | 1900  | 1901  | 1902  | 1903  | 1904  | 1905  | 1906  | 1907  | 1908  | 1909  | 1910  | 1911  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| January .....   | 23.85 | 15.10 | 16.25 | 23.45 | 14.47 | 17.85 | 19.60 | 25.85 | 18.45 | 17.35 | 19.00 | 15.50 |
| February .....  | 23.85 | 14.60 | 16.85 | 23.35 | 13.91 | 17.85 | 19.41 | 25.85 | 18.16 | 16.75 | 19.00 | 15.50 |
| March .....     | 23.85 | 15.60 | 18.51 | 23.22 | 14.05 | 17.80 | 19.35 | 26.10 | 17.85 | 16.50 | 18.30 | 15.50 |
| April .....     | 23.72 | 15.85 | 18.97 | 22.87 | 14.35 | 17.60 | 19.10 | 26.35 | 17.73 | 16.50 | 17.50 | 15.00 |
| May .....       | 22.65 | 15.85 | 20.85 | 20.72 | 13.85 | 17.60 | 18.90 | 26.85 | 17.63 | 16.50 | 17.06 | 15.00 |
| June .....      | 20.72 | 15.35 | 21.85 | 19.85 | 13.70 | 17.00 | 18.54 | 26.60 | 17.73 | 16.50 | 16.75 | 15.00 |
| July .....      | 18.60 | 15.35 | 21.60 | 18.25 | 13.60 | 16.47 | 18.60 | 25.55 | 17.53 | 17.00 | 16.56 | 14.87 |
| August .....    | 16.25 | 15.35 | 22.10 | 17.22 | 13.60 | 16.60 | 19.45 | 24.85 | 17.35 | 17.13 | 16.50 | 14.50 |
| September ..... | 15.35 | 15.35 | 23.35 | 16.41 | 13.85 | 16.60 | 20.16 | 24.10 | 17.05 | 18.70 | 16.40 | 14.50 |
| October .....   | 14.85 | 15.10 | 23.35 | 15.70 | 14.10 | 17.66 | 21.48 | 22.45 | 16.85 | 19.00 | 16.06 | 14.46 |
| November .....  | 14.85 | 15.23 | 23.35 | 15.10 | 15.98 | 19.15 | 24.70 | 20.66 | 17.10 | 19.00 | 16.00 | 14.07 |
| December .....  | 15.10 | 15.85 | 23.35 | 14.81 | 16.95 | 19.60 | 25.85 | 18.80 | 17.35 | 19.00 | 16.00 | 14.00 |

The Cincinnati prices given above date back to the earliest period for which Southern pig iron quotations are available at that point. It may be said that these quotations represent almost the beginning of the Northern business in pig iron coming from the vicinity of Birmingham, Ala.

The Chicago prices also represent quotations from the beginning of the production of pig iron in the vicinity of Chicago for the merchant trade. For a long time these prices were quoted delivered on track near Chicago foundries, but beginning in 1898 prices were figured at the furnace, from which at that time a switching charge to local foundries of about 35 cents per ton applied. At the present time the switching charge averages about 50 cents.

Mechanical and Civil Engineers.

PITTSBURGH, PA.

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## CONTENTS.

|   |       |
|---|-------|
| Features of a New Machine Shop.....                       | 1331  |
| Blower Equipment of American Dreadnaughts.....            | 1335  |
| The New Haven Permanent Exhibition.....                   | 1335  |
| Safeguards for Electric Cranes.....                       | 1336  |
| Blowholes in Steel Ingots.....                            | 1338  |
| Performance of Electric Motor Trucks.....                 | 1339  |
| Five-Cylinder Engines for Reversing Mills.....            | 1340  |
| Boring with a Radial Drilling Machine.....                | 1342  |
| The Economy Hack Sawing Machine.....                      | 1342a |
| The National Association of Manufacturers.....            | 1342a |
| A New Grinding Machine.....                               | 1342b |
| The Pennsylvania Railroad and Its Employees.....          | 1342c |
| A New Steam Turbine.....                                  | 1342d |
| Safety Device for Wire Straighteners.....                 | 1342f |
| Wallace & Sons' Pension Plan.....                         | 1342f |
| Hackettstown Furnace Property to Be Sold.....             | 1342f |
| New Square Box Dump Car.....                              | 1342g |
| The Baltimore Tube Company.....                           | 1342g |
| Senator Oliver on the Underwood Bill.....                 | 1342g |
| Ball Bearing Polishing Stand.....                         | 1342g |
| A Special Roll Grinding Machine.....                      | 1342h |
| William B. Pollock Company's Pipe Line Contract.....      | 1342h |
| A Heavy Bethlehem Steel Casting.....                      | 1342h |
| Circulation Test of a Steam Boiler.....                   | 1343  |
| American Blower Company's Annual Convention.....          | 1343  |
| Pig Iron Contract Stipulations.....                       | 1343  |
| Corrosion of Iron and Steel.....                          | 1344  |
| Iron Corrosion Investigations.....                        | 1346  |
| Increase in Pig Iron Melt Since January.....              | 1347  |
| New American Members of the Iron and Steel Institute..... | 1347  |
| The Steel Corporation Dissolution Suit.....               | 1348  |
| The Exhaustion of Connellsville Coking Coal.....          | 1350  |
| Foundry Fire Protection and Insurance.....                | 1350  |
| Pig Iron Prices at Cincinnati and Chicago.....            | 1351  |
| The Inestimable Services of James M. Swank.....           | 1352  |
| That "Economic Crime".....                                | 1353  |
| Lot Sizes in Building Machine Tools.....                  | 1353  |
| Standardizing Machine Tools.....                          | 1354  |
| International Steel Specifications.....                   | 1354  |
| Heavy Hardware Jobbers' Convention.....                   | 1355  |
| For Lower Coke and Iron Ore Rates.....                    | 1355  |
| Development of Steam Turbines.....                        | 1355  |
| B. Nicoll & Co. to Sell Davis Coal and Coke.....          | 1355  |
| The McKinley Birthplace Memorial.....                     | 1355  |
| A Tour of Charcoal Iron Furnaces.....                     | 1355  |
| The Iron and Metal Markets.....                           | 1356  |
| New Steel Foundry at Hamilton, Ont.....                   | 1367  |
| Personal.....   | 1368  |
| Obituary.....   | 1368  |
| Pittsburgh and Vicinity Business Notes.....               | 1368  |
| An American Ingot Iron Pamphlet.....                      | 1368  |
| New Publications.....                                     | 1369  |
| Chicago Foundrymen's Club Reunion.....                    | 1369  |
| A Large Mesta Casting.....                                | 1369  |
| Electrical Control of a Large Mine Hoist.....             | 1370  |
| New Tools and Appliances.....                             | 1371  |
| The Machinery Markets.....                                | 1372  |
| Judicial Decisions of Interest to Manufacturers.....      | 1381  |
| Trade Publications.....                                   | 1382  |

## The Inestimable Services of James M. Swank

Andrew Carnegie once said "the American iron and steel industry owes an unpayable debt of gratitude to Swank," a statement which differed from some of Mr. Carnegie's utterances in that it was not calculated to arouse opposition or criticism. Everyone in the trade knows Mr. Swank and knows how incomparably useful his services have been.

Under date of December 31, 1908, Mr. Swank tendered his resignation as general manager of the American Iron and Steel Association. The resignation was addressed to Joseph Wharton, president of the association, but Mr. Wharton died January 11, 1909, and conditions then became such that it could not be accepted, nor could a successor be selected, and Mr. Swank's devotion to the work has kept him at it, probably against his will, for more than three years since he formally expressed his decision to lay it down. He had, indeed, long desired to retire because of delicate health, and as far back as in 1897, upon the completion of a quarter century of service, he expressed the thought that his labors might soon terminate.

It has remained for the American Iron and Steel Institute to open a way whereby Mr. Swank may cease his labors for the iron trade without feeling that he leaves the work in jeopardy, for arrangements have been made whereby at the close of the present year the Institute will take over the work of the American Iron and Steel Association. Mr. Swank will then have concluded a period of no less than 40 years of continuous service to the American iron and steel industry, or half his lifetime, as he will be 80 years old in July.

Rarely, indeed, in any walk of life has it been possible for a man to serve in one capacity for so long a time. When the exacting nature of the work of gathering production statistics of the entire American iron and steel trade is considered, Mr. Swank's record becomes truly exceptional. At the beginning of 1873 he became secretary of the association. On January 6, 1885, the office of general manager was created, Mr. Swank being immediately elected to fill the office. It is true that the association had been in existence almost 18 years before he was called to direct its affairs, but it was Mr. Swank who originated a definite system of gathering complete annual statistics of production, his first report covering the year 1872, so that with the completion of the compilations for the year 1911 he will have personally gathered the production for 40 of the years of this great industry. In doing so he has established a standard of accuracy and completeness which is met by the iron and steel statistics of no other country. Mr. Swank also founded the Iron and Steel Works Directory, the familiar form in which we all know it being that of his first edition, published in 1874, but containing only 106 pages. It should be noted, however, that in 1859 "The Iron Manufacturer's Guide to the Furnaces, Forges and Rolling Mills of the United States" had been published by the association, during the secretaryship of Prof. J. P. Leslie, afterward State Geologist of Pennsylvania, and a few years later a partial compilation of blast furnaces had been undertaken. The tenth edition of Swank's directory was reached in 1890, the last being the seventeenth, published in 1908, to which supplements were added in 1910 and early in the present year.

Mr. Swank has set a standard of accuracy and completeness in American iron and steel production statistics which it will be ample credit to the management



of the American Iron and Steel Institute to succeed in maintaining. The Institute may well adopt as its policy that simply to continue the work as well as Mr. Swank has performed it will constitute an achievement. That improvement will be attempted from time to time there is every reason to expect, but the principle should be definitely laid down that merely to carry on the work conducted continuously for 40 years by one man of rare ability and unmatched devotion involves in itself a task of no mean proportions.

The brief review we have given has shown that Mr. Swank is the American Iron and Steel Association. Manufacturers have intrusted their individual statistics to him. The Institute already has prestige and should acquire more, whereby it should be able to command greater speed on the part of individuals in furnishing statistics, whereby results may be published closer to the expiration of the period covered, but if the Institute realizes upon this prestige by enabling the statistics to be presented more promptly it should not be forgotten that the established accuracy of Mr. Swank's compilations has been due to his ability and to the fact that the responsibility rested upon one pair of shoulders, and the Institute should therefore arrange that the work should be continued as the task of a responsible individual. No divided responsibility, no force of clerks, can replace James M. Swank. However great the prestige of the Institute, the need of a personally responsible statistician is imperative.

### That "Economic Crime"

In *The Iron Age* of June 22, 1911, editorial reference was made to an attack by the American Metal Market on the Gary policy of cooperation for its encouragement of an increase in productive capacity. Our contemporary said that this policy "which means maintaining prices and dividing the tonnage, far from curbing new erection in time of slack demand, or excess of capacity over requirements, actually encourages it. New blast furnaces, new steel works, new finishing mills are being built galore. Only a few days ago one of the important independent companies reached its final decision to add a large open-hearth steel plant to its present Bessemer plant." It proceeded to say, "This encouragement of new erection under conditions existing for the past four years is an economic crime." The Steel Corporation itself was severely criticised for having built the great plant at Gary, Ind.

The editorial article in *The Iron Age* characterized the strictures in the American Metal Market as being too severe, if not wholly unwarranted. Discussing the continued building of new plants, the statement was made that "if the steel manufacturers had decided in 1907 that no new construction should be undertaken, or if any set of manufacturers had decided to make conditions so unsatisfactory that no one of their number or any outside interest could see any inducement for enlarging old works or building new ones" the time would have come within a comparatively brief period thereafter when the productive capacity of this country would have been totally inadequate to supply the demand for iron and steel. The claim was made that such a procedure would have been a more serious economic mistake for the country than

the conditions set forth by the American Metal Market. The article concluded with the following prediction: "The time will surely come, and possibly it may not be far distant, when the country will need every pound of iron and steel which its furnaces and mills can turn out. When that day comes consumers will have reason for thankfulness that the expansion of the industry was not completely checked in the period extending from 1908 to 1911."

The above words were printed less than one year ago, and what do we now find? So gorged with orders are the steel works that numerous finishing mills are unable to secure a sufficient supply of billets or sheet bars to enable them to run to capacity. Premiums are being paid for steel for prompt delivery, and steel plants are shipping their billets and sheet bars to mills which would only draw their supplies from such sources under extraordinary conditions of stress. In some branches of trade makers of finished products are also falling considerably behind in deliveries. Even the Gary steel plant, regarded by the American Metal Market as a most serious economic mistake, is running to capacity without being able to supply completely the heavy demand originating in its immediate territory.

### Lot Sizes in Building Machine Tools

In the effort to get a maximum of production on a minimum of investment, the tendency in machine tool building has been to increase to the extreme point the sizes of lots put through the works. A certain amount of reaction has now set in, however, because it has been found that though the larger the lots the lower the cost of the individual unit, they may yet be so large as to constitute a loss. Considerations other than manufacturing costs must be taken into account. The fact is now recognized by some of the most important American houses and their effort is to find the mean point.

Even in the most highly specialized machine tool shops the product has a good deal of variety, taking in the various sizes. An important disadvantage in too large a lot is that it is cumbersome and blocks the way for other divisions of product, and may even create confusion. Also it ties up capital. To assume a case: A company's market calls for 100 machines of a given size a year. If all are put through in one lot the manufacturing cost per unit will be lower than if they are manufactured in four lots of 25 each, spread through the 12 months. On the other hand a good deal of money will be tied up in the large lot instead of being released and used over again, as is the case with the smaller lot. If the latter cost \$10,000 to manufacture, that amount of money will be used four times in the year, under normal conditions, while if the larger lot costs \$40,000, or four times the smaller, minus the saving resulting from producing in greater quantities, the capital will lie idle during a certain important part of the year. Though the lower cost of the 100 machine lot makes the profit larger so far as the manufacturing expense is concerned, the interest on the non-producing capital eliminates all or much of this gain. Nor is this the whole story. The small lot will be followed by similar orders of other sizes of machines, and so on, as the market warrants. The shop is producing numbers of small lots at one time

instead of a few big lots. The problem is to find the size that is neither too large nor too small.

In other words, to manufacture machine tools with the greatest profit on the capital invested, the point must be ascertained where the curve of manufacturing cost crosses the curve of financial efficiency. If a curve were plotted showing the variations in cost of production with lots of increasing size, it would ascend very rapidly, as five machines were increased to 10, then to 20, and so on up to a certain limit, and would gradually become practically a horizontal line as economies decreased when large lots were made still larger. Another curve plotted from the experiences of the financial side of the business, giving the variations in economies and losses other than those of manufacturing as between lot sizes, would intersect the first curve at the point of greatest efficiency.

### Standardizing Machine Tools

The organized movement toward the standardization of machine tools started recently by the National Machine Tool Builders' Association should bring important results if the work be done with energy and also in the spirit of full and perhaps unselfish cooperation on the part of the members. The industry needs the standardization of its products, especially where greater economy and convenience would result to users of machinery. As has been pointed out many times, every machine shop is compelled to carry duplicates of auxiliary equipment simply because more than one make of a given type of machine is in use. Chucks, face plates and similar appurtenances fit but one builder's machines as a general rule. To bring about the improved condition by gradual stages would not seem to be a very serious problem. All that it needs is a good beginning. If the standardization committee would select some one needed reform and if the interested builders would agree to assist in carrying it through, the benefits of the changes would doubtless be quickly recognized and other similar reforms would follow as a matter of course, until only refinements of standardization would remain to be determined. Undoubtedly the committee will tabulate the product of the different manufacturers of each type of machine as to its essential details—a work which would assist greatly in the effort to secure a greater uniformity of product. The tables would reveal, for example, the sizes and threaded pitches of lathe spindle noses, which are most commonly chosen by designers, and so on through the various elements in the proposed evolution.

The standardization of machine names is another work in which the committee will be interested. This task should grow easier with the acquired momentum of the four years since the new nomenclature was first suggested. The energetic campaign conducted by a few enthusiasts is now meeting a good response and the more correct nomenclature is already in common use. The planer is now a planing machine, the drill a drilling machine, the grinder a grinding machine and so on through the list. The campaign is largely one of education and suggestion.

The sale of the plant of the Union Sheet & Tin Plate Company, Marietta, Ohio, has been authorized by the United States Court. The property is appraised at \$45,000.

### International Steel Specifications

#### Adverse Action by a Committee Meeting Held in London— Consideration by the New York Congress Opposed

Members of a sub-committee of the Iron and Steel Committee of the International Association for Testing Materials met in London May 8 to consider the proposal for international specifications for iron and steel. Dr. W. C. Unwin was in the chair and there were present Sir H. F. Donaldson, G. Ainsworth (Ingot Makers' Association), Walter Croke, Charles Dresser, M. Greiner (Seraing), F. W. Harbord, W. G. Kirkaldy, G. Lemmy, G. C. Lloyd (secretary Iron and Steel Institute), J. Reay, Dr. A. von Reippel, George Ritchie, J. H. Roberts, Leslie S. Robertson, E. H. Saniter, E. Schaltenbrand (Stahlwerks Verband), Dr. E. Schrödter (Verein Deutscher Eisenhüttenleute), Fairfax Scott and H. J. Skelton, the last two representing the British Iron Trade Association. W. A. Bostwick, Carnegie Steel Company, and William R. Webster, Philadelphia, the American members of the sub-committee, were not present.

Dr. von Reippel, who had been made chairman of the committee on international iron and steel specifications, explained the difficulties encountered. Lately the committee had dealt with the specifications of Great Britain, the United States and Germany. The American members had proposed that for shipbuilding the British Lloyds should be accepted, but that the specifications of Lloyds should be supplemented by an analysis. For structural materials the Americans proposed their own specification, and with regard to railroad material the Americans stated that it was too early yet to make a proposition. He (Dr. von Reippel) had tried to condense the specifications of the three countries into a uniform specification, but this uniform specification was so wide that it was impossible. He therefore regretted that he was unable to make any proposition.

Mr. Greiner thought the difficulties not as great as Dr. von Reippel believed. For rails, the English, German and American specifications differed little, perhaps not at all. Let each country have its own specifications for the different railroads, but for export the difficulty was absolutely not great between the three countries, for rails at any rate. For structural steel it was a different matter, but he did not think it was of such account that they could not overcome the difficulties.

H. J. Skelton took issue with Mr. Greiner's optimism. He spoke of the stringency of British specifications on bridge steel, which ruled out basic Bessemer, in spite of the admirable manufacture of basic Bessemer steel in Germany. He saw that even on rails, on which it had been said there were no great differences, three or four specifications would be needed in international work. He added that he was telling no secret in saying that the British Engineering Standard Committee had just decided that the time had come for a new British standard specification for steel rails.

Mr. Schaltenbrand referred to rail specifications as particularly unsettled at the present time. "In America they have been specifying very hard rails for some time, but now, after many breakages, they are considering a softer quality again. In Germany our rails are somewhat softer than the American. Five or six months ago our government elected a commission with the object of making a close investigation, and it would be premature now to agree to a universal specification while this work has not been finished."

The drift of further discussion was quite strongly against international agreement and it was the sentiment of the meeting that there be no discussion of the subject at the coming New York meeting of the International Association. The following resolution was adopted unanimously:

"The representative German, Belgian and British manufacturers and users of iron and steel present at this meeting desire to place on record their regret that the American representatives have been prevented from being present. They have carefully considered in all its bearings the question of the introduction of uniform international specifications, and after taking into consideration the various manufacturing conditions prevailing in the respective countries are of opinion: (1) That the time is not ripe for the Sixth Congress of the International Association for Test-



ing Materials to make any recommendations for the adoption of such international specifications. (2) That the meeting fully recognizes the desirability of such international specifications when an agreement can be reached, and they desire the committee to continue its work, but they are unanimously of opinion that any action at the forthcoming Congress would be undesirable.

"They desire that the best thanks of this meeting be given to the chairman and to the members of the committee of the International Association for the care and attention which they have devoted to this matter, and that they be requested to send a copy of the resolutions to the Council of the International Association for Testing Materials for presentation to the Sixth Congress."

### Heavy Hardware Jobbers' Convention

The American Iron, Steel & Heavy Hardware Association will hold its annual convention in Boston, Mass., June 4, 5 and 6. The headquarters will be at the Hotel Somerset. It is expected that about 150 iron and steel jobbers will participate in the proceedings. The president of this association is E. P. Sanderson, E. P. Sanderson Company, Boston, Mass.; first vice-president, Charles E. Faeth, Faeth Iron Company, Kansas City, Mo.; second vice-president, H. E. Tredway, John Ernsdorff Iron Company, Dubuque, Iowa; secretary-treasurer, E. R. Yarnelle, Marbridge Building, Broadway and Thirty-fourth street, New York. The Executive Committee consists of E. W. A. Waterhouse, Waterhouse & Lester, San Francisco, Cal.; C. M. Roehm, Roehm & Davison, Detroit, Mich.; J. A. Gregg, Nicols, Dean & Gregg, St. Paul, Minn.; Charles C. Lewis, Charles C. Lewis Company, Springfield, Mass.; J. Henry Ruwe, Ruwe Brothers, Brooklyn, N. Y.; George E. Enos, Enos & Sanderson Company, Buffalo, N. Y.

### For Lower Coke and Iron Ore Rates

The case of the iron and steel manufacturers of the Mahoning Valley against the Pittsburgh & Lake Erie and other railroads, in which a reduction is asked in the rate of \$1.35 on coke from Connellsville, Pa., to Youngstown, Ohio, came up before the Interstate Commerce Commission at Washington this week. James A. Campbell, president of the Youngstown Sheet & Tube Company, gave testimony on Monday, May 27. The claim is that the rate is excessive and is a discrimination in favor of manufacturers in competing districts. A reduction is asked to 85 cents, which is the rate on coal between Connellsville and Youngstown.

Argument was made before the Interstate Commerce Commission on May 15 in the case of B. Nicoll & Co., New York, against the Delaware, Lackawanna & Western and other railroads, also that of the Wharton Steel Company against the same defendants. A reduction is asked in the rate on iron ore from New Jersey mines to various blast furnace districts, the rate from Ringwood, N. J., being taken as the basis of comparisons, which show much lower rates per ton per mile on ore from various New York points to the blast furnaces in question—as low as 3 and 4 mills per ton mile, as against 9.3 mills from Ringwood. The commission took the cases under advisement.

The consulting metallurgical business conducted by E. F. Lake, at Bayonne, N. J., has been merged with the metallurgical engineering firm of Nixon & Raab, under the name of Lake, Nixon & Raab, at 156 Fairview, avenue, South Orange, N. J. Die-casting machinery, alloys and processes, and the heat treatment and carbonizing of steel will be specialized. All kinds of physical tests and chemical analyses will be given the various metal products. The firm will also give advice regarding the methods and machinery or apparatus to be used in melting, alloying, casting, forging, welding, galvanizing, coloring and plating or otherwise treating either ferrous or non-ferrous metals or alloys.

The name of the Ohio Crucible Steel Company, Cleveland, Ohio, has been changed to the Atlas Steel Foundry Company, which announces that it has entered into the production of open-hearth steel castings, but will continue the production of small steel castings as heretofore.

### Development of Steam Turbines

At the spring meeting of the American Society of Mechanical Engineers held in Cleveland, Ohio, this week, A. G. Christy presented a paper which dealt with the present state of the development of the leading types of large steam turbines, some details of their construction, the commercial results obtained and some new uses to which steam turbines have been put. For the purpose of discussion large steam turbines are divided into two types, the fundamental and the modified or combined. The weak elements of the fundamental type are discussed and the advantages of the new types are pointed out, the construction of some of the latter being shown in section. A full discussion of the details of construction is given, and for a rapid comparison of the practice of various manufacturers, a table, with brief notes of the construction of individual types, is included. Comparison on the basis of efficiency as shown by the published results of tests of different types is also made. The present status of low-pressure turbines, turbo-compressors, turbo-driven pumps, geared turbines, and marine turbines is briefly discussed and the closing paragraphs deal with the probable trend of steam turbine development and future possibilities.

**B. Nicoll & Co. to Sell Davis Coal and Coke.**—B. Nicoll & Co., 149 Broadway, New York, have become sales agents for the Davis Coal & Coke Company, Philadelphia, in all districts except New England. The general offices of the Davis company have been removed from Philadelphia to the Singer Building, New York, and B. Nicoll & Co. have established their accounting department on the 24th floor of that building, with executive offices on the 28th floor, as at present. E. Kelly Rothstein, vice president and general manager of sales of the Davis Coal & Coke Company, becomes manager of the coal and coke department of B. Nicoll & Co. The various district offices of the Davis company have been taken over. F. F. Chadwick continues as manager at Philadelphia, with offices in the Land Title Building and E. F. Rizer, Jr., as manager of the Reading, Pa., office. B. Nicoll & Co. have been selling agents for the Pittsburgh Terminal Railway & Coal Company for the past four years. Adding to the gas coal of the latter company the steam coal of the Davis Coal & Coke Company, B. Nicoll & Co. become one of the most important factors in the soft coal trade east of Pittsburgh.

**The McKinley Birthplace Memorial.**—At the dinner of the American Iron and Steel Institute at the Waldorf-Astoria, New York, May 17, Joseph G. Butler, Jr., Youngstown, Ohio, brought up a subject in which he has taken special interest—the proposal to erect in memory of the late President McKinley a fireproof memorial building at his birthplace, Niles, Ohio. Mr. Butler has sent in the past week to each member of the American Iron and Steel Institute a subscription blank and has suggested that the memorial should be very largely provided for by those connected with the iron and steel industry. Mr. Butler is president of the National McKinley Birthplace Memorial Association; John G. Milburn, New York, is vice-president; J. G. Schmidlapp, Cincinnati, treasurer, and W. A. Thomas, Niles, Ohio, secretary. The above named and Myron G. Herrick constitute the board of trustees. It is the plan of the trustees to raise \$100,000.

**A Tour of Charcoal Iron Furnaces.**—Representatives of the various offices of Rogers, Brown & Co. recently spent a week visiting the furnaces of the Lake Superior Iron & Chemical Company. The party consisted of William T. Shepard, Buffalo; Noah H. Swayne, 2d, Philadelphia; R. W. Clark, New York; A. J. Wentworth and F. W. Miller, Cincinnati; J. C. Mears, St. Louis, and J. R. Darragh, Pittsburgh. Accompanying them as representative of the Lake Superior Iron & Chemical Company was William Wilkins, general superintendent of furnaces. Leaving Detroit May 17 the party spent most of the ensuing week on the trip, going in turn to Elk Rapids, Boyne City, Manistique and Newberry, Mich., and Ashland, Wis.

# The Iron and Metal Markets

## Record Open-Hearth Steel Output

### Coke Still the Key to the Situation

#### Bridge Work and Other Railroad Contracts an Important Feature—Pig Iron Stocks Less

Each week emphasizes the great preponderance of open-hearth steel in the present heavy consumption of rolling mill products. There is some slack capacity on the Bessemer side of the industry, but it will remain ineffective so long as railroad buying continues the most important factor in the demand. Our open-hearth steel ingot production is estimated to be at the rate of 22,000,000 tons a year and that of Bessemer steel at 8,000,000 tons. The Steel Corporation's ingot production continues at the rate of 17,800,000 tons a year.

Our reports from all markets refer to the fact that new buying is not heavy; at the same time it is sufficient in the case of some important producers to replace the tonnage going out of the mills. The Steel Corporation's statement, for example, is not expected to show any diminution in unfilled orders. In wire, sheets and wrought pipe its May business was greater than that of April.

July 1 will bring the expiration of a good many contracts that when renewed will be at higher prices. Shipments in June will naturally be large, as unspecified material will be cancelled at the end of the month. Current bookings are probably averaging throughout the list of finished products \$3 a ton above the prices of six months ago.

Coke may assume greater importance as a limiting factor in iron and steel production. While immigration has been heavy in April and May, the labor supply in the coke regions grows very slowly. Coke prices for early delivery have yielded somewhat since the strike settlements, but at the prices asked for contract coke, \$2.35 to \$2.50 at ovens, furnaces now out of blast cannot afford to blow in unless they can establish a higher level for pig iron.

The question of deliveries by mills to car works is assuming some importance and here and there the offering of a premium for summer shipments points to the urgent need of the new cars now under contract. With the railroads the case is evidently one of getting all the rails, track supplies and equipment possible without creating too strong an impression that they are able to buy these things.

Bridge work let by railroads in May has been larger than in months, probably 50,000 tons. One item this week is 5400 tons for a viaduct at Des Moines for the St. Paul. Rail orders for the week, with no large contracts, have amounted to 20,000 tons. The Illinois Central will buy 25,000 tons more and the Harriman lines are not through buying for new construction.

New vessel building is bringing considerable business to the mills. For four additional Standard Oil boats for the lakes about 7000 tons of plates and shapes have been placed at Pittsburgh. Atlantic coast shipyards which recently bid on four vessels for fruit companies, are now figuring on two for other trade. One large producer has withdrawn from the Eastern plate market and Eastern plate mills have made sales for early delivery in Chicago and Central Western districts at prices above the 1.25c. Pittsburgh basis.

While the volume of fabricating contracts in May

has run close to the records of 1906, when 200,000 tons was booked in one month, statements differ as to the degree of improvement in fabricating prices. In the East some sharply competitive work has brought out figures based on 1.15c. for structural steel. On smaller contracts better figures have been realized.

Some large inquiries for line pipe are pending. In merchant pipe prices have been well maintained and an advance of \$2 a ton is a possibility.

A further purchase of sheet bars by a large producer of sheets and tin plates is reported. The tin plate situation is very firm, some mills being filled up for more than six months. The size of the domestic demand has been such, in fact, as to limit exports which have been so assiduously cultivated in the past year.

Buyers of semi-finished steel, particularly sheet bars, still have trouble getting deliveries. Offers of open-hearth billets in Great Britain by a Southern plant are reported at 97s. 9d. c.i.f., Glasgow.

The Pittsburgh market for steel making irons has grown quieter and prices are easier. A sale of 10,000 to 12,000 tons of basic iron for delivery in western Pennsylvania is reported at \$13 at Valley furnace. Bessemer iron is nominally \$14.25. At St. Louis sales of 27,000 tons of Southern basic have been made to steel casting plants. Stocks of iron in steel company and merchant furnace yards in Ohio and in Pennsylvania west of the Alleghenies decreased about 5 per cent. in the first half of May.

Foundry iron markets show that the buying movement is pretty well spent. In the East pipe companies have bought 15,000 to 20,000 tons more. Prices in eastern Pennsylvania are rather firmer, but Central Western markets show that all sellers are not equally confident.

Connellsville coke for June shipment has sold at \$2.15 to \$2.25, and in sales for prompt shipment \$2 has been shaded. For the second half considerable business is pending, but furnaces are not disposed to tie up at the figures on which producers are now insisting.

## A Comparison of Prices

### Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

|                                      | May 29, 1912. | May 22, 1912. | Apr. 24, 1912. | May 24, 1911. |
|--------------------------------------|---------------|---------------|----------------|---------------|
| <b>Pig Iron, Per Gross Ton:</b>      |               |               |                |               |
| Foundry No. 2 standard, Philadelphia | \$15.25       | \$15.25       | \$15.00        | \$15.50       |
| Foundry No. 2, Valley furnace        | 13.25         | 13.25         | 13.25          | 13.75         |
| Foundry No. 2, Southern, Cincinnati  | 14.25         | 14.25         | 13.75          | 13.75         |
| Foundry No. 2, Birmingham, Ala.      | 11.00         | 11.00         | 10.50          | 10.50         |
| Foundry No. 2, at furnace, Chicago   | 14.50         | 14.50         | 14.00          | 15.00         |
| Basic, delivered, eastern Pa.        | 15.25         | 15.00         | 15.00          | 14.50         |
| Basic, Valley furnace                | 13.00         | 13.00         | 13.00          | 13.25         |
| Bessemer, Pittsburgh                 | 15.15         | 15.15         | 15.15          | 15.90         |
| Malleable Bessemer, Chicago          | 14.50         | 14.50         | 14.00          | 15.00         |
| Gray forge, Pittsburgh               | 13.90         | 13.90         | 13.65          | 14.15         |
| Lake Superior charcoal, Chicago      | 15.75         | 15.75         | 15.75          | 17.00         |
| <b>Billets, etc., Per Gross Ton:</b> |               |               |                |               |
| Bessemer billets, Pittsburgh         | 21.00         | 21.00         | 20.00          | 23.00         |
| Open hearth billets, Pittsburgh      | 20.50         | 20.50         | 20.00          | 23.00         |
| Forging billets, Pittsburgh          | 28.00         | 27.00         | 27.00          | 28.00         |
| Open hearth billets, Philadelphia    | 23.40         | 23.40         | 22.40          | 25.40         |
| Wire rods, Pittsburgh                | 25.00         | 25.00         | 25.00          | 29.00         |
| <b>Old Material, Per Gross Ton:</b>  |               |               |                |               |
| Iron rails, Chicago                  | 16.00         | 16.00         | 16.00          | 14.50         |
| Iron rails, Philadelphia             | 16.50         | 16.50         | 15.50          | 16.75         |
| Car wheels, Chicago                  | 14.00         | 14.00         | 13.50          | 12.75         |
| Car wheels, Philadelphia             | 13.50         | 13.50         | 13.00          | 13.00         |
| Heavy steel scrap, Pittsburgh        | 13.25         | 13.25         | 13.25          | 13.00         |
| Heavy steel scrap, Chicago           | 12.00         | 11.75         | 11.75          | 10.25         |
| Heavy steel scrap, Philadelphia      | 13.50         | 13.50         | 13.25          | 13.00         |

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.



## Finished Iron and Steel.

|                                   | May 29,<br>1912. | May 22,<br>1912. | Apr. 24,<br>1912. | May 24,<br>1911. |
|-----------------------------------|------------------|------------------|-------------------|------------------|
| Per Pound to Largest Buyers:      | Cents.           | Cents.           | Cents.            | Cents.           |
| Bessemer rails, heavy, at mill..  | 1.25             | 1.25             | 1.25              | 1.25             |
| Iron bars, Philadelphia.....      | 1.30             | 1.30             | 1.27½             | 1.27             |
| Iron bars, Pittsburgh.....        | 1.25             | 1.25             | 1.25              | 1.30             |
| Iron bars, Chicago.....           | 1.25             | 1.25             | 1.15              | 1.22             |
| Steel bars, Pittsburgh.....       | 1.20             | 1.20             | 1.20              | 1.40             |
| Steel bars, tidewater, New York.  | 1.36             | 1.36             | 1.36              | 1.56             |
| Tank plates, Pittsburgh.....      | 1.25             | 1.25             | 1.25              | 1.40             |
| Tank plates, tidewater, New York. | 1.41             | 1.36             | 1.41              | 1.56             |
| Beams, Pittsburgh.....            | 1.25             | 1.25             | 1.25              | 1.40             |
| Beams, tidewater, New York....    | 1.41             | 1.36             | 1.36              | 1.56             |
| Angles, Pittsburgh.....           | 1.25             | 1.25             | 1.25              | 1.40             |
| Angles, tidewater, New York....   | 1.41             | 1.36             | 1.36              | 1.56             |
| Skelp, grooved steel, Pittsburgh. | 1.15             | 1.15             | 1.12½             | 1.30             |
| Skelp, sheared steel, Pittsburgh. | 1.20             | 1.20             | 1.17½             | 1.35             |

## Sheets, Nails and Wire.

|                                     | Cents. | Cents. | Cents. | Cents. |
|-------------------------------------|--------|--------|--------|--------|
| Per Pound to Largest Buyers:        |        |        |        |        |
| Sheets, black, No. 28, Pittsburgh   | 1.90   | 1.90   | 1.90   | 2.20   |
| Wire nails, Pittsburgh.....         | 1.60   | 1.60   | 1.60   | 1.80   |
| Cut nails, Pittsburgh.....          | 1.55   | 1.55   | 1.55   | 1.60   |
| Fence wire, ann'led, 0 to 9, P.g.h. | 1.40   | 1.40   | 1.40   | 1.60   |
| Barb wire, galv., Pittsburgh....    | 1.90   | 1.90   | 1.90   | 2.10   |

## Coke, Connellsville,

|                                  | Cents. | Cents. | Cents. | Cents. |
|----------------------------------|--------|--------|--------|--------|
| Per Net Ton, at Oven:            |        |        |        |        |
| Furnace coke, prompt shipment..  | \$2.70 | \$2.20 | \$2.60 | \$1.45 |
| Furnace coke, future delivery... | 2.35   | 2.35   | 2.25   | 1.75   |
| Foundry coke, prompt shipment.   | 2.50   | 2.50   | 2.75   | 1.75   |
| Foundry coke, future delivery.   | 2.50   | 2.40   | 2.65   | 2.00   |

## Metals, Per Pound:

|                                  | Cents. | Cents. | Cents. | Cents. |
|----------------------------------|--------|--------|--------|--------|
| Lake copper, New York.....       | 16.75  | 16.62½ | 16.00  | 12.37½ |
| Electrolytic copper, New York.   | 16.62½ | 16.37½ | 15.87½ | 12.12½ |
| Spelter, St. Louis.....          | 6.75   | 6.70   | 6.85   | 5.20   |
| Spelter, New York.....           | 6.90   | 6.85   | 7.00   | 5.56   |
| Lead, St. Louis.....             | 4.12½  | 4.07½  | 4.12½  | 4.22½  |
| Lead, New York.....              | 4.20   | 4.20   | 4.20   | 4.37½  |
| Tin, New York.....               | 46.00  | 45.50  | 44.75  | 44.60  |
| Antimony, Hallett, New York...   | 7.62½  | 7.62½  | 7.75   | 9.00   |
| Tin plate, 100-lb. box, New York | \$3.64 | \$3.64 | \$3.54 | \$3.94 |

## Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

**Plates.**—Tank plates, ¼ in. thick, 6½ in. up to 100 in. wide, 1.25c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¾ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square ft. are considered ¾-in. plates. Plates over 72 in. wide must be ordered ¾ in. thick on edge, or not less than 11 lb. per square ft. to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot, down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

| Extras.  | Cents per lb. |
|--|---------------|
| Gauges under ¾ in. to and including 3-16 in. on thinnest edge.....           | .10           |
| Gauges under 3-16 in. to and including No. 8.....                            | .15           |
| Gauges under No. 8 to and including No. 9.....                               | .25           |
| Gauges under No. 9 to and including No. 10.....                              | .30           |
| Gauges under No. 10 to and including No. 12.....                             | .40           |
| Sketches (including all straight taper plates) 3 ft. and over in length..... | .10           |
| Complete circles, 3 ft. in diameter and over.....                            | .20           |
| Boiler and flange steel.....   | .10           |
| "A. B. M. A." and ordinary firebox steel.....                                | .20           |
| Still bottom steel.....  | .30           |
| Marine steel.....  | .40           |
| Locomotive firebox steel.....  | .50           |
| Widths over 100 in. up to 110 in., inclusive.....                            | .05           |
| Widths over 110 in. up to 115 in., inclusive.....                            | .10           |
| Widths over 115 in. up to 120 in., inclusive.....                            | .15           |
| Widths over 120 in. up to 125 in., inclusive.....                            | .25           |
| Widths over 125 in. up to 130 in., inclusive.....                            | .50           |
| Widths over 130 in.....  | 1.00          |
| Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive.....         | .25           |
| Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive.....         | .50           |
| Cutting to lengths or diameters under 1 ft.....                              | 1.55          |
| No charge for cutting rectangular plates to lengths 3 ft. and over.          |               |

**Wire Rods and Wire.**—Bessemer, open hearth and chain rods, \$25. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, \$1.40; galvanized, \$1.70. Carload lots to retailers, annealed, \$1.50; galvanized, \$1.80. Galvanized barb wire, to jobbers, \$1.90; painted, \$1.60. Wire nails, to jobbers, \$1.60.

The following table gives the prices to retail mer-

chants on wire in less than carloads, including the extras Nos. 10 to 16, which are added to the base price:

|                  | No. 0 to 9 | 10     | 11     | 12 & 12½ | 13     | 14     | 15     | 16     |
|------------------|------------|--------|--------|----------|--------|--------|--------|--------|
| Annealed .....   | \$1.55     | \$1.60 | \$1.65 | \$1.70   | \$1.80 | \$1.90 | \$2.00 | \$2.10 |
| Galvanized ..... | 1.85       | 1.90   | 1.95   | 2.00     | 2.10   | 2.20   | 2.60   | 2.70   |

**Structural Material.**—I-beams, 3 to 15 in.; channels, 3 to 15 in., and angles, 3 to 6 in., on one or both legs, ¼ in. and over, 1.25c. Other shapes and sizes are quoted as follows:

|  | Cents per lb. |
|--|---------------|
| I-beams over 15 in.....  | 1.30 to 1.35  |
| H-beams over 18 in.....  | 1.30 to 1.35  |
| Angles over 6 in.....  | 1.30 to 1.35  |
| Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card Sept. 1, 1909..... | 1.30 to 1.35  |
| Tees, 3 in. and up.....  | 1.30 to 1.35  |
| Zees, 3 in. and up.....  | 1.25 to 1.30  |
| Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909.....                    | 1.30 to 1.35  |
| Deck beams and bulb angles.....  | 1.55 to 1.60  |
| Hand rail tees.....  | 2.10 to 2.25  |
| Checkered, trough and corrugated floor plates.....   | 2.25 to 2.50  |

## Extras for Cutting to Length.

|  | Cents per lb. |
|--|---------------|
| Under 3 ft., to 2 ft., inclusive.....            | .25           |
| Under 2 ft., to 1 ft., inclusive.....            | .50           |
| Under 1 ft.....                                  | 1.55          |
| No charge for cutting to lengths 3 ft. and over. |               |

**Sheets.**—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows:

## Blue Annealed Sheets.

|                     |              |
|---------------------|--------------|
| Nos. 3 to 8.....    | 1.25 to 1.30 |
| Nos. 9 and 10.....  | 1.35 to 1.40 |
| Nos. 11 and 12..... | 1.40 to 1.45 |
| Nos. 13 and 14..... | 1.45 to 1.50 |
| Nos. 15 and 16..... | 1.55 to 1.60 |

## Box Annealed Sheets, Cold Rolled.

|                         |              |
|-------------------------|--------------|
| Nos. 10 to 12.....      | 1.55 to 1.60 |
| Nos. 13 and 14.....     | 1.60 to 1.65 |
| Nos. 15 and 16.....     | 1.65 to 1.70 |
| Nos. 17 to 21.....      | 1.70 to 1.75 |
| Nos. 22, 23 and 24..... | 1.75 to 1.80 |
| Nos. 25 and 26.....     | 1.80 to 1.85 |
| No. 27.....             | 1.85 to 1.90 |
| No. 28.....             | 1.90 to 1.95 |
| No. 29.....             | 1.95 to 2.00 |
| No. 30.....             | 2.05 to 2.10 |

## Galvanized Sheets of Black Sheet Gauge.

|                         |              |
|-------------------------|--------------|
| Nos. 10 and 11.....     | 1.90 to 2.00 |
| Nos. 12, 13 and 14..... | 2.00 to 2.10 |
| Nos. 15 and 16.....     | 2.10 to 2.15 |
| Nos. 17 to 21.....      | 2.20 to 2.40 |
| Nos. 22, 23 and 24..... | 2.40 to 2.50 |
| Nos. 25 and 26.....     | 2.60 to 2.70 |
| No. 27.....             | 2.75 to 2.85 |
| No. 28.....             | 2.90 to 3.00 |
| No. 29.....             | 3.00 to 3.10 |
| No. 30.....             | 3.20 to 3.30 |

All above rates on sheets are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following:

## Corrugated Roofing Sheets by Weight.

Effective April 18, 1912, the rates for painted and formed roofing sheets, per 100 lb., as announced by the American Sheet & Tin Plate Company, are based on the following extras for painting and forming over prices for corresponding gauges in black and galvanized sheets:

|  | 29   | 25 to 28 | 19 to 24 | 12 to 18 |
|--|------|----------|----------|----------|
| Painting.  |      |          |          |          |
| Regular or oiling.....                             | .15  | .10      | .05      |          |
| Graphite, regular.....                             | .25  | .10      | .10      |          |
| Forming.   |      |          |          |          |
| 2, 2½, 3 and 5 in. corrugated.....                 | 0.05 | 0.05     | 0.05     | 0.05     |
| 2 V-crimped, without sticks.....                   | 0.05 | 0.05     | 0.05     |          |
| ¾ to 1½ in. corrugated.....                        | 0.10 | 0.10     | 0.10     |          |
| 3 V-crimped, without sticks.....                   | 0.10 | 0.10     | 0.10     |          |
| Pressed standing seam, with cleats.....            |      | 0.15     | 0.15     |          |
| Plain roll roofing, with or without cleats.....    | 0.15 | 0.15     | 0.15     |          |
| Plain brick siding.....                            |      | 0.20     |          |          |
| 3/15 in. crimped.....                              | 0.20 | 0.20     | 0.20     |          |
| Weatherboard siding.....                           |      | 0.25     | 0.25     |          |
| Beaded ceiling.....                                |      | 0.25     | 0.25     |          |
| Rock face brick and stone siding.....              |      | 0.25     |          |          |
| Roll and cap roofing, with caps and cleats.....    | 0.25 | 0.25     |          |          |
| Roofing valley, 12 in. and wider.....              |      | 0.25     | 0.25     |          |
| Ridge roll and flashing (plain or corrugated)..... |      | 0.65     | 0.65     | 0.65     |

## Corrugated Roofing Sheets, with ¾-In. Corrugations, Per Square.

Some leading manufacturers of roofing material are still quoting on an area basis and are naming prices as follows:

| Gauge.  | Painted. | Galvanized. | Gauge.  | Painted. | Galvanized. |
|---------|----------|-------------|---------|----------|-------------|
| 29..... |          | \$2.40      | 23..... | \$2.30   | \$3.50      |
| 28..... | \$1.35   | 2.35        | 22..... | 2.50     | 3.80        |
| 27..... | 1.50     | 2.60        | 21..... | 2.70     | 4.05        |
| 26..... | 1.60     | 2.65        | 20..... | 2.90     | 4.35        |
| 25..... | 1.80     | 3.05        | 18..... | 2.90     | 5.70        |
| 24..... | 2.00     | 3.15        | 16..... | 4.70     | 6.50        |

**Wrought Pipe.**—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from December 1, 1911; galvanized iron pipe, from March 1, 1912:

|                      | Steel  |       | Iron   |       |
|----------------------|--------|-------|--------|-------|
|                      | Black. | Galv. | Black. | Galv. |
| 1/4 and 1/2 in.....  | 74     | 54    | 68     | 49    |
| 3/8 in.....          | 75     | 65    | 69     | 53    |
| 1/2 in.....          | 78     | 68    | 72     | 59    |
| 3/4 to 1 1/2 in..... | 81     | 72    | 75     | 64    |
| 2 to 3 in.....       | 82     | 75    | 76     | 65    |

| Lap Weld.               |    |    |    |    |
|-------------------------|----|----|----|----|
| 1 1/4 and 1 1/2 in..... | .. | .. | 68 | 61 |
| 2 in.....               | 79 | 72 | 72 | 63 |
| 2 1/2 to 4 in.....      | 81 | 74 | 74 | 66 |
| 4 1/2 to 6 in.....      | 80 | 72 | 73 | 65 |
| 7 to 12 in.....         | 78 | 68 | 71 | 61 |
| 13 to 15 in.....        | 55 | .. | 47 | .. |

| Butt Weld, extra strong, plain ends, card weight. |    |    |    |    |
|---|----|----|----|----|
| 1/8, 1/4, 3/8 in.....                             | 70 | 60 | 65 | 55 |
| 1/2 in.....                                       | 75 | 69 | 70 | 63 |
| 3/4 to 1 1/2 in.....                              | 79 | 73 | 74 | 65 |
| 2 to 3 in.....                                    | 80 | 74 | 75 | 66 |

| Lap Weld, extra strong, plain ends, card weight. |    |    |    |    |
|--|----|----|----|----|
| 1 1/2 in.....                                    | .. | .. | 66 | 60 |
| 2 in.....  | 76 | 70 | 71 | 63 |
| 2 1/2 to 4 in.....                               | 78 | 72 | 73 | 66 |
| 4 1/2 to 6 in.....                               | 77 | 71 | 72 | 65 |
| 7 to 8 in.....                                   | 70 | 60 | 65 | 55 |
| 9 to 12 in.....                                  | 65 | 55 | 60 | 50 |

| Butt Weld, double extra strong, plain ends, card weight. |    |    |    |    |
|--|----|----|----|----|
| 1/2 in.....  | 65 | 59 | 60 | 52 |
| 3/4 to 1 1/2 in.....                                     | 68 | 62 | 63 | 55 |
| 2 to 3 in.....   | 70 | 64 | 65 | 57 |

| Lap Weld, double extra strong, plain ends, card weight. |    |    |    |    |
|---|----|----|----|----|
| 2 in.....   | 66 | 60 | 61 | 52 |
| 2 1/2 to 4 in.....                                      | 68 | 62 | 63 | 57 |
| 4 1/2 to 6 in.....                                      | 67 | 61 | 62 | 56 |
| 7 to 8 in.....  | 60 | 50 | 55 | 45 |

#### Plugged and Reamed.

|                                  |  |
|----------------------------------|--|
| 1 to 1 1/2, 2 to 3 in. Butt Weld | Will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld as specified. |
| 2, 2 1/2 to 4 in. Lap Weld       |  |

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

**Boiler Tubes.**—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

|                        |        | Standard Charcoal Iron.  |
|------------------------|--------|--------------------------|
| 1 3/4 to 2 1/4 in..... | 64     | 1 1/2 in.....48          |
| 2 1/2 in.....          | 66 1/2 | 1 3/4 to 2 1/4 in.....50 |
| 2 3/4 to 3 1/4 in..... | 71 1/2 | 2 1/2 in.....55          |
| 3 1/2 to 4 in.....     | 74     | 2 3/4 to 5 in.....60     |
| 5 to 6 in.....         | 66 1/2 |                          |
| 7 to 13 in.....        | 64     |                          |

2 1/2 in. and smaller, over 18 ft., 10 per cent. net extra.

2 3/4 in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f. o. b. mill at Pittsburgh basing discount, lowered by two points.

## Pittsburgh

PITTSBURGH, PA., May 29, 1912.—(By Telephone.)

**Pig Iron.**—The only sale of note the past week was one of 10,000 to 12,000 tons of basic for delivery to a western Pennsylvania open-hearth steel plant on the basis of \$13, Valley furnace. The sale was made by a local dealer. There is little new inquiry for Bessemer iron, and the quoted price of \$14.25 at Valley furnace could be shaded 10c. to 15c. a ton. There has been a fair amount of quiet buying of foundry iron for last half on the basis of \$13.25, Valley furnace, for No. 2. An inquiry is out for 5000 to 6000 tons of gray forge, and the business is expected to be closed at about \$12.75, Valley furnace. The tone of the market is weaker. While prices have not actually declined they are not as strong as they were two weeks ago, there being more disposition to sell for last half delivery at present prices. We quote standard Bessemer iron at \$14.25 to \$14.50; basic, \$13 to \$13.25; malleable Bessemer, \$13 to \$13.25; No. 2 foundry, prompt delivery, \$13.25, and for last half, \$13.50; gray forge, \$13, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

**Steel.**—Nearly all consumers of billets and sheet bars have contracts, but shipments by makers are very unsatisfactory. The leading sheet and tin plate interest is reported to have bought another large tonnage of steel from an Eastern mill to meet its requirements. A sale of 1000 tons of 4 x 4 in. open hearth billets is reported at about \$21, Pittsburgh. We quote open hearth billets \$20.50 to \$21; Bessemer billets, \$21 to \$21.50; Bessemer and open-hearth sheet bars, \$21.50 to \$22; axle billets, \$25; forging billets, for general forging purposes, \$28, all f.o.b. Pittsburgh and Youngstown.

#### (By Mail)

While the amount of new business has been rather light for the past two or three weeks, this is not giving much concern to manufacturers. They realize that it is a natural result of the heavy buying some time ago, when nearly all consumers covered their requirements for a long period ahead. The heavy specifications that are being received by the mills are a strong indication of actual consumption, which at present is the greatest ever known in the history of the steel trade. The local feeling is very optimistic. There is a fair amount of new inquiry for pig iron, but, while the market is firm, the expected advance in prices has not materialized, which is rather disappointing to the producers. There is more disposition among merchant furnaces to sell for second half, and one large lot of basic for such delivery was closed this week at a lower price than anticipated. The steel billet market is very strong and additional purchases of billets and sheet bars have been made by leading Pittsburgh mills to help out on their commitments to consumers. The situation in finished iron and steel is very strong. While the mills are not participating as yet to much extent in the prices now being quoted, July 1 will see the expiration of a good many contracts that, when renewed, will be placed at slightly better prices. The scrap trade is fairly active, with indications pointing to higher prices. Prices on prompt furnace coke have gone off still further, but coke for last half is very firm.

**Ferroalloys.**—Sales of 400 to 500 tons of 80 per cent. ferromanganese for last half are reported at the full price of \$48.50, Baltimore. There is still a great scarcity for prompt shipment and \$54 to \$55 can be obtained where the seller will agree to make such delivery. The higher prices ruling on ferromanganese have firmed up the market on ferrosilicon and it is reported that prices may be higher in the near future. We note three or four sales of small lots of 50 per cent. ferrosilicon at the full price of \$70, delivered. One maker of the lower grades is reported to be asking \$1 a ton advance for delivery after July 1. We quote 50 per cent. in lots up to 100 tons, at \$70; over 100 tons to 600 tons, \$69, and over 600 tons, \$68, Pittsburgh. The lower grades are ruling at about \$20 for 10 per cent.; \$21 for 11 per cent.; \$22 for 12 per cent., f.o.b. cars at furnace, Ashland, Ky., or Jackson, Ohio. On ferrotitanium we quote 8c. per lb. for carload lots; 10c. per lb. in 2000-lb. lots and over, and 12 1/2c. per lb. in lots up to 2000 lb.

**Wire Rods.**—Some consumers whose contracts expire June 30 are figuring on their requirements for last half and a good deal of tonnage is expected to be placed shortly. Outside of this the demand is light and only for occasional small lots. Prices are firm. We continue to quote Bessemer, open-hearth and chain rods at \$25 to \$26, Pittsburgh, one leading maker holding firmly at the outside price.

**Muck Bar.**—There is no new inquiry. No sales have been reported in this market for some time. We continue to quote best grades, made from all pig iron, at \$29, delivered buyer's mill in the Pittsburgh district.

**Skelp.**—There is a heavier new demand for both iron and steel skelp than for a long time, and two local mills report that their commitments will take their entire output for several months. Several fairly large sales of grooved iron skelp are reported at about 1.55c. delivered. We quote grooved steel skelp at 1.15c. to 1.17 1/2c.; sheared steel skelp, 1.30c. to 1.22 1/2c.; grooved iron skelp, 1.55c. to 1.60c.; sheared iron skelp, 1.65c. to 1.70c., delivered at buyer's mill, Pittsburgh district.

**Steel Rails.**—The Ohio works of the Carnegie Steel Company will go on open-hearth rails next week, to fill a large foreign contract which will keep the plant busy for the next month or more. Specifications against contracts for standard sections are coming in quite freely but no large orders have recently been taken by the local interest. The demand for light rails is more active than for some time, and in the past week the Carnegie Company received new orders and specifications for about 2500 tons. We quote splice bars at 1.50c. per lb. and rails as follows: Standard sections, 1.25c. per lb.; 8 and 10-lb. light rails, 1.20 1/2c.; 12 and



14-lb. 1.20c.; 16 and 20-lb., 1.15c.; 25, 30, 35, 40 and 45-lb., 1.10c., in carload lots, f.o.b., Pittsburgh.

**Structural Material.**—The Riter-Conley Mfg. Company, announced last week as the low bidder, has been awarded the contract for about 4000 tons for new buildings for the open-hearth plant of the Pittsburgh Steel Company, Monessen, Pa. Inquiry is more active, and fabricators report that they are now able to obtain slightly better prices. Several of the leading interests are pretty well filled up for some months and are not seeking new business so aggressively as they were. The market is firm. We quote beams and channels up to 15 in. at 1.25c. Pittsburgh.

**Plates.**—No car orders have been placed with local makers the past week. Car inquiries have quieted down very much recently. The local plate mills are so congested with business, however, that they rather welcome a lull in new orders, as it will give them a chance to catch up on contracts on which they are from four to eight weeks behind in shipments. One local mill reports that it is practically filled up on all it can turn out to October 1, while another leading mill states that it has only a limited tonnage available for third quarter. The market is firm. We quote  $\frac{3}{4}$  in. and heavier plates at 1.25c. Pittsburgh.

**Iron and Steel Bars.**—The amount of new buying in both iron and steel bars is rather light, but this is due to the fact that most consumers are covered for some months. For this reason the price of 1.20c. on steel bars has not been very strongly tested, but all the leading makers are holding firmly and report that they are entering small orders on this basis for delivery in four to eight weeks after date of contract. The output of steel bars is now the heaviest ever known, and shipments this month will probably break all records. In spite of this nearly all the mills are considerably behind in deliveries, one leading maker reporting that no contracts will be taken for delivery inside of 60 days from date of order. The new demand for iron bars is more active, and specifications against contracts are coming in very freely. We quote steel bars on new orders at 1.20c. and common iron bars at 1.25c. to 1.30c. Pittsburgh.

**Tin Plate.**—A moderate amount of new business has been placed since the price was advanced 10c. a box May 16. Most consumers were given a chance to cover requirements prior to the advance and did so at prices ranging from \$3.30 to \$3.40 per base box for 14 x 20 coke plates in large lots. Specifications against these contracts are very heavy and shipments by the mills in May are expected to be fully as large as in April, which was a record month. There is a scarcity in the supply of tin bars which is being felt by all the tin plate companies. The American Sheet & Tin Plate Company has bought 25,000 to 30,000 tons of tin bars from outside steel mills to help out on its contracts. All the leading tin plate mills are running to practically full capacity, have the greater part of their output sold up to July 1 and have a good deal of business entered for delivery for the quarter ended September 30. The tone of the market is strong. We quote \$3.40 to \$3.50 per base box.

**Sheets.**—The volume of specifications against contracts is very heavy, and it seems certain that shipments of sheets in May will be as large as in April, when a record was made. The new demand continues fairly heavy and some of the mills are back from four to six weeks or longer in shipments. The only complaint among sheet mills at present is regarding the scarcity in supply of sheet bars, many mills having trouble in getting steel fast enough to supply their needs. All the leading sheet makers are operating to full capacity. Prices are very firm. No. 28 black sheets are held at 1.90c. to 1.95c., and galvanized sheets from 2.90c. to 3c., Pittsburgh, the lower prices being absolutely minimum.

**Hoops and Bands.**—The new demand is rather light, but this is because consumers are covered by contracts against which they are specifying very freely. Some large contracts for hoops that will expire June 30 have been renewed for delivery in last half at the reported price of 1.25c., Pittsburgh. We quote steel bands on new orders at 1.25c., with extras as per the steel bar card, and steel hoops at 1.25c. to 1.30c., the lower price being stated to be absolutely minimum of the market.

**Rivets and Bolts.**—The new demand for both rivets and bolts is fairly active. Some makers report they are considerably behind in shipments, and are not booking new orders for delivery inside of six weeks. We quote structural rivets at \$1.50 to \$1.55 per 100 lb. base and boiler rivets at \$1.60 to \$1.65 per 100 lb. base, in carload lots, f.o.b. cars Pittsburgh. Prices on bolts are reported to be firm and it is stated that all the makers are quoting full prices. We quote: Small carriage bolts, cut

thread, 80 and 7½ per cent. off; small carriage bolts, rolled threads, 80 and 15 off; large carriage bolts, 75 and 10 off; small machine bolts, rolled threads, 80 and 20 off; small machine nuts, cut threads, 80 and 12½ off; large machine bolts, 75 and 15 off; square hot-pressed nuts, blank or tapped, \$6.30 off, and hexagon nuts, \$7.10 off. These prices are in lots of 300 lb. or over delivered within a 20c. freight radius of maker's works.

**Shafting.**—A fair demand is reported, mostly for small lots, but makers state that specifications against contracts have been coming in a little more freely in the past week. As yet there has been no improvement in prices which have been ruling very low for a long time. We quote cold-rolled shafting at 67 per cent. off in carloads and larger lots, and 62 per cent. in less than carload lots, delivered in base territory.

**Spelter.**—The market has been very firm and we quote prime grades of Western at 6.82½c., Pittsburgh. A sale of 50 tons for June delivery is reported at this price.

**Railroad Spikes.**—The new demand is rather quiet, but the railroads are specifying liberally against the heavy contracts placed some time ago. Prices are firm. We quote base sizes at \$1.45 per 100 lb., f.o.b. Pittsburgh.

**Wire Products.**—The wire trade has quieted down a good deal in the past two weeks, new demand being light and only for small lots, while the mills report that specifications against contracts are only fair. It is evident that the season in wire and wire nails is pretty well over, and new demand is likely to be quiet until about August, when fall trade is expected to open up. Some contracts for wire nails placed some time ago at lower prices than are ruling now will probably be cancelled June 1 for the unshipped portions, notice to this effect having been sent out by several makers recently. It is believed that some of the trade in wire and wire nails that was lost to the mills in the spring because of the late season will be made up when fall trade opens. We quote wire nails at \$1.60; cut nails, \$1.50; galvanized barb wire, \$1.90; painted, \$1.60; annealed fence wire, \$1.40, and galvanized fence wire, \$1.70, f.o.b. Pittsburgh, usual terms, freight added to point of delivery.

**Merchant Pipe.**—The new demand continues quite active and orders and shipments this month will be considerably heavier than in April. Several of the leading mills report that their orders so far this year sent to the mills for rolling are 30 to 35 per cent. heavier than in the same period last year. No large contracts for line pipe have recently been placed, but several good inquiries are in the market. It is stated that regular discounts on iron and steel pipe are being fairly well maintained, being shaded in very exceptional cases.

**Boiler Tubes.**—Mills report that buyers are specifying freely against contracts and shipments this month will be considerably heavier than in April. The new demand for tubes is fair. It is stated that the recent advance of one point, or \$2 a ton, is being maintained.

**Coke.**—The available supply of furnace coke for prompt shipment is considerably larger, due to an embargo on coke routed for shipment to Canada and as a result prices have gone off to a slight extent. A sale of 3000 tons of furnace coke for spot shipment is reported at \$1.90, but standard grades of furnace coke are held at \$2 to \$2.10 per net ton at oven. A Youngstown furnace interest last week bought 15,000 tons of standard furnace coke for June shipment, the business being divided among three sellers, one selling 5000 tons at \$2.25 and the others at a slightly lower price, reported as about \$2.15 at oven. Several fairly large inquiries for furnace coke for last half are in the market and are expected to be closed shortly. We quote standard grades of furnace coke for prompt shipment at \$2.10 to \$2.25 per net ton at oven. Best makes of 72-hour foundry coke for prompt shipment are held at \$2.50 to \$2.75 at oven. The output of coke in the Upper and Lower Connellsville region last week was 398,956 tons, a decrease of about 3000 tons on the previous week.

**Iron and Steel Scrap.**—Consumers are willing to take in scrap quite freely at prevailing prices, but dealers are not disposed to take contracts, fearing they may have trouble to cover on any considerable quantities. The consumption at present is probably the heaviest ever known and with the available supply rather limited dealers are confidently looking for higher prices in the near future. The demand for heavy steel scrap, cast iron borings and machine shop turnings is particularly active and full prices are being paid. Low phosphorus, melting stock, which has been very dull for some time, is also looking up and prices are firmer. We note sales of 3000 to 4000 tons of heavy steel scrap on the basis of \$13.25 per gross ton, delivered in the Pittsburgh dis-

trict, and 600 tons of cast iron borings at \$9.75, delivered. Dealers are quoting as follows, per gross ton, f.o.b. Pittsburgh, unless otherwise noted:

|   |                  |
|---|------------------|
| Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery ..... | \$13.25          |
| No. 1 foundry cast .....  | \$12.75 to 13.00 |
| No. 2 foundry cast .....  | 10.75 to 11.00   |
| Bundled sheet scrap f.o.b. consumers' mill, Pittsburgh district .....                                     | 11.25 to 11.50   |
| Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa. ....                      | 13.75 to 14.00   |
| No. 1 railroad malleable stock .....  | 11.75 to 12.00   |
| Grate bars .....  | 9.50 to 9.75     |
| Low phosphorus melting stock .....  | 15.00            |
| Iron car axles .....  | 21.00 to 21.50   |
| Steel car axles .....   | 15.75 to 16.00   |
| Locomotive axles .....  | 22.00 to 22.50   |
| No. 1 busheling scrap .....   | 12.00 to 12.25   |
| No. 2 busheling scrap .....   | 8.00 to 8.25     |
| Old car wheels .....  | 14.00 to 14.25   |
| *Cast iron borings .....  | 9.75 to 10.00    |
| *Machine shop turnings .....  | 10.00 to 10.25   |
| †Sheet bar crop ends .....  | 14.00 to 14.25   |
| Old iron rails .....  | 14.50 to 14.75   |
| No. 1 wrought scrap .....   | 13.00 to 13.25   |
| Heavy steel axle turnings .....   | 10.25 to 10.50   |
| Stove plate .....   | 9.50 to 9.75     |

\*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

## Chicago

CHICAGO, ILL., May 28, 1912.

New business has been comparatively light in this district, but the mills, crowded as all of them in this territory are, welcome a respite from the rush to which they have been subjected. Deliveries continue long delayed, and some customers have been considerably inconvenienced. It now is hardly possible to obtain plates or structural shapes before September, and bar deliveries run well into August. Some classes of sheets can be delivered within a month while galvanized requires about six weeks. Higher prices for steel bars are rumored, but aside from this there are no indications pointing to advances in the finished steel products. The pig iron market is quiet, but both Northern and Southern irons are firmly held at their respective quotations. Southern iron for last half delivery is more generally on the basis of \$11.50, Birmingham, which is an advance of 50c. over our quotation of last week. In the old material market the heavy demand for steel and rolling mill scrap continues, while cast scrap is more or less inactive. The rural demand for wire products, although waning in volume, indicates very satisfactory conditions.

**Pig Iron.**—With the exception of two large inquiries for basic iron in the Southwest, aggregating 15,000 tons, the smaller of which has been temporarily withdrawn while the other seems likely to go to a Southern furnace, the local market has been devoid of negotiations involving large tonnage. The position of Southern furnaces is well maintained on the strength of sales made to a large extent in the South. A number of small orders for Southern iron have been placed here, however, a considerable portion being on the basis of \$11.50, Birmingham, for No. 2. The leading interests are generally asking \$11.50 for last half delivery, although \$11 for prompt shipment has not entirely disappeared, particularly on speculative iron. Enough current business in local iron is transpiring to preserve the strength of the situation on the basis of \$14.50 at furnace for No. 2. We quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

|  |                    |
|--|--------------------|
| Lake Superior charcoal .....                           | \$15.75 to \$16.50 |
| Northern coke foundry, No. 1 .....                     | 15.00              |
| Northern coke foundry, No. 2 .....                     | 14.50              |
| Northern coke foundry, No. 3 .....                     | 14.25              |
| Northern Scotch, No. 1 .....                           | 16.00              |
| Southern coke, No. 1 foundry and No. 1 soft .....      | 15.85 to 16.35     |
| Southern coke, No. 2 foundry and No. 2 soft .....      | 15.35 to 15.85     |
| Southern coke, No. 3 .....                             | 15.10 to 15.60     |
| Southern coke, No. 4 .....                             | 14.60 to 15.10     |
| Southern gray forge .....                              | 14.10 to 14.60     |
| Southern mottled .....                                 | 13.85              |
| Malleable Bessemer .....                               | 14.50              |
| Standard Bessemer .....                                | 16.75              |
| Basic .....  | 14.75              |
| Jackson County and Kentucky silvery, 6 per cent. ....  | 16.90              |
| Jackson County and Kentucky silvery, 8 per cent. ....  | 17.90              |
| Jackson County and Kentucky silvery, 10 per cent. .... | 18.90              |

**Rails and Track Supplies.**—A number of small contracts for rails were placed the past week, but new business is insignificant compared with specifications. The railroad inquiry for track fastenings is heavy, and both specifications and contracts aggregate a liberal tonnage. We quote standard railroad spikes at 1.55c. to 1.65c., base; track bolts with square nuts, 1.95c., base, all in carload lots, Chicago; standard section Bessemer

rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.20c. to 1.25c.; 16 to 20 lb., 1.25c. to 1.30c.; 12 lb., 1.30c. to 1.35c.; 8 lb., 1.35c. to 1.40c.; angle bars, 1.50c., Chicago.

**Structural Material.**—Of 17 contracts for fabricated material reported the past week, aggregating about 13,000 tons, the principal items were as follows: Viaduct, 5405 tons, at Des Moines, for the Chicago, Milwaukee & St. Paul Railroad, and 1485 tons for the Minnesota Steel Company's plant at Duluth, both taken by the American Bridge Company, which also was awarded 770 tons of bridge shapes for the Chicago Great Western and 504 tons for a highway bridge at Woodland, Wash. The Milwaukee Bridge Company will furnish 700 tons for the Milwaukee Corrugating Company's plant, Milwaukee, Wis. Other items include 352 tons for a bridge at Riverside, Wash.; 111 tons for the Stewart garage at Rockford, Ill.; 700 tons for Koppers coke ovens, Woodward, Ala.; Joliet Bridge & Iron Company; 102 tons for train sheds at Joliet, Ill.; 170 tons for John A. Roe Cut Stone Company's mill building at Bedford, Ind.; 110 tons for a historical building at Madison, Wis.; 368 tons for the Carter White Lead Company, Pullman, Ill., to the South Halsted Street Iron Works; 124 tons for a college at Winona, Minn., and 103 tons for high school building at Biwabik, Minn., both awarded to the American Bridge Company. The American Bridge Company will also furnish 250 tons for a coal handling bridge for the Semet-Solvay Coke Company, Detroit, and 167 tons for the Salinas River bridge in California. The only important car orders pending are for the Illinois Central, Frisco and Kansas Southern, mention of which has been made previously. Specifications against contracts continue to come in steadily. We quote for Chicago delivery, mill shipment, on plain shapes, 1.43c., and from store, 1.70c.

**Plates.**—Local mills are considerably behind some of the Eastern makers of plates in the matter of deliveries, and consumers desiring shipment within six weeks find it necessary to buy from Pittsburgh or Buffalo mills. It is sometimes possible, depending upon the nature of the order, to work in certain specifications for a more advantageous delivery from local mills. We continue to quote for Chicago delivery, mill shipment, 1.43c., and from store, 1.70c.

**Bars.**—Rumors are more or less current of a possible advance in the price of steel bars of \$1 a ton. This is somewhat indefinite and at best would be applicable only to a small current tonnage. Bar iron buying is rather heavier than local mills are desirous of accepting at present prices and further advances are predicted. We quote as follows: Bar iron, 1.25c.; hard steel bars, 1.20c. to 1.25c.; soft steel bars, 1.38c., and from store, soft steel bars, 1.60c., Chicago.

**Sheets.**—Sheet business continues heavy and there is less incentive to irregularity in prices. The local mills are not offering blue annealed sheets for delivery inside of three weeks nor galvanized in less than five or six weeks. For roofing sheets the price per square is generally disappearing, sales being made here on the pound basis. We quote Chicago delivery as follows: Carload lots, from mill, No. 28 black sheets, 2.08c. to 2.13c.; No. 28 galvanized, 3.13c. to 3.18c.; No. 10 blue annealed, 1.58c. to 1.63c. Prices from store are: No. 10, 1.95c.; No. 12, 2c.; No. 28 black, 2.30c., and No. 28 galvanized, 3.45c.

**Rivets and Bolts.**—The local steel mill making rivets reports its capacity filled into July. Because of the low prices for steel bars which have prevailed some irregularity in the price of rivets continues which will be eliminated with advancing prices of raw material. The manufacturers' schedule of discounts for carriage bolts has been revised and we quote, effective May 21, as follows: Carriage bolts up to 3/4 in. x 6 in., rolled thread, 80 and 15; cut thread, 80 and 7 1/2; larger sizes, 75 and 7 1/2; machine bolts up to 3/4 in. x 4 in., rolled thread, 80 and 20; cut thread, 80 and 12 1/2, larger sizes, 75 and 12 1/2; coach screws, 80 and 20; hot pressed nuts, square head, \$6.40 off per cwt.; hexagon, \$7.30 off per cwt. Structural rivets, 1/2 in. and larger, 1.68c. base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

**Old Material.**—Scrap melters are still experiencing considerable difficulty in handling incoming cars at their plants and the market for prompt shipment material is correspondingly handicapped. There is, however, a little cessation in the buying for forward consumption. This is particularly true of steel and rolling mill scrap and in the East for borings and turnings. Stove plate and cast scrap continue inactive. The Northern Pacific Railroad has a list out of about 3000 tons; the Chicago & Northwestern 4000 tons, of which the principal item is 700 tons of rails, and the Chicago, Rock Island & Pacific, 5500 tons, including 1000 tons of No. 1 wrought. Prices have not changed



materially, except for a slight advance in steel scrap and malleable foundry scrap. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

| Per Gross Ton.  |                    |
|---|--------------------|
| Old iron rails .....  | \$16.00 to \$16.50 |
| Old steel rails, rerolling .....                              | 13.25 to 13.75     |
| Old steel rails, less than 3 ft. ....                         | 12.50 to 13.00     |
| Relaying rails, standard section, subject to inspection ..... | 24.00              |
| Old car wheels .....  | 14.00 to 14.50     |
| Heavy melting steel scrap .....                               | 12.00 to 12.50     |
| Frogs, switches and guards, cut apart .....                   | 12.00 to 12.50     |
| Shoveling steel .....   | 12.00 to 12.50     |
| Steel axle turnings .....                                     | 9.50 to 10.00      |
| Per Net Ton.  |                    |
| Iron angles and splice bars .....                             | \$13.75 to \$14.25 |
| Iron arch bars and transoms .....                             | 15.25 to 15.75     |
| Steel angle bars .....  | 11.75 to 12.25     |
| Iron car axles .....  | 19.25 to 19.75     |
| Steel car axles .....   | 15.75 to 16.25     |
| No. 1 railroad wrought .....                                  | 12.50 to 13.00     |
| No. 2 railroad wrought .....                                  | 11.50 to 12.00     |
| Steel knuckles and couplers .....                             | 11.25 to 11.75     |
| Steel springs .....   | 11.75 to 12.25     |
| Locomotive tires, smooth .....                                | 12.50 to 13.00     |
| Machine shop turnings .....                                   | 7.50 to 8.00       |
| Cast and mixed borings .....                                  | 6.75 to 7.00       |
| No. 1 busheling .....   | 10.25 to 10.75     |
| No. 2 busheling .....   | 7.75 to 8.00       |
| No. 1 boilers, cut to sheets and rings .....                  | 8.50 to 9.00       |
| Boiler punchings .....  | 13.00 to 13.50     |
| No. 1 cast scrap .....  | 11.75 to 12.25     |
| Stove plate and light cast scrap .....                        | 10.25 to 10.75     |
| Railroad malleable .....                                      | 11.75 to 12.25     |
| Agricultural malleable .....                                  | 10.75 to 11.25     |
| Pipes and flues .....   | 9.25 to 9.75       |

**Wire Products.**—The most active demand for wire at the present time comes from manufacturers, who are contracting in anticipation of fall trade. The consumption of wire for farm purposes shows the diminishing influence of the advancing season. Wire nails continue to move freely. We quote as follows: Plain wire, No. 9 and coarser, base, \$1.58; wire nails, \$1.78; painted barb wire, \$1.78 to \$1.83; galvanized, \$2.08; polished staples, \$1.83; galvanized, \$2.13, all Chicago.

**Cast Iron Pipe.**—From Omaha, Neb., tentative inquiries for a considerable amount of cast iron pipe are being sent out and bids are being asked for May 29. The American Cast Iron Pipe Company was awarded 300 tons at Sioux City, Iowa, and a similar amount at Decatur, Ill., was placed with the United States Cast Iron Pipe & Foundry Company. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$27; 6 to 12 in., \$25; 16 in. and up, \$24.50, with \$1 extra for gas pipe.

## Philadelphia

PHILADELPHIA, PA., May 28, 1912.

Somewhat better buying in all branches is noted, while specifications against contracts have been heavier and deliveries are becoming less prompt. Inquiries for foundry pig iron have been more pronounced. There is a stiffening in quotations, and an advance in the higher foundry numbers, prices of which have been out of line with other grades, is looked for. A moderate movement in steel making irons is reported. Finished products are more firmly established at the recent 1.40c. level for plates and structural shapes. In addition to the four vessels for one of the large fruit companies, recently reported, Delaware River shipyards are figuring on two more vessels, which will require from 2000 to 3000 tons each of plates and shapes. Concessions on structural material are less noticeable, as mills are gradually being filled with work. A very good demand for steel billets is noted, with further contracts for third quarter, while an order for 5000 tons for export has been taken by a local seller. Higher prices are being asked for refined iron bars. The coke situation is still unsettled, makers and consumers being apart as to prices. Old material is quiet with prices unchanged but firm.

**Iron Ore.**—While offerings of domestic ore are reported no sales of importance are announced. The foreign ore situation continues quiet, the high freights and scarcity of bottoms necessarily restricting this business. Importations during the week were heavier and more diversified than has been the case for a long time, comprising 12,540 tons of Newfoundland, 750 tons of Venezuelan, 7171 tons of Swedish, 5250 tons of New Brunswick and 3600 tons of Cuban ore.

**Pig Iron.**—The general tone of the market is stronger, with prices showing an upward tendency. Inquiries are more pronounced, particularly for forward delivery and in instances quotations above the recent market have been named by producers in this district. The Pennsylvania Railroad has inquiries out for 2100 to 4200 tons of high silicon, 2000 to 4000 tons

of low silicon coke foundry, and 600 to 1200 tons of both Northern and Southern charcoal iron for third quarter requirements at its Altoona shops. The Norfolk & Western is also in the market for 4500 tons of mixed foundry grades. Inquiries ranging from a few hundred up to 1000 tons from the general foundry trade are also noted. The Delaware River cast iron pipe foundries are still seeking iron. One is out with an inquiry for 5000 tons for July shipment, while another has taken on various lots ranging from a few hundred up to 1000 tons. Low grade iron is scarce and prices range from \$14.50 to \$14.75, delivered, for high sulphur off iron, and in instances slightly higher for low sulphur pipe grades. Considerable miscellaneous business in foundry iron is pending, but most buyers are holding off, awaiting definite establishment of the higher quotations. Moderate sales of standard eastern Pennsylvania No. 2 X are made at \$15.25 to \$15.50, delivered. One Lehigh Valley producer has advanced its price of No. 2 X for third quarter to \$15.75, and reports entering some business at that figure. The complexity of the coke situation still has an important bearing on the market and is a large factor in the making of prices for deliveries extending over the second half. Current sales of No. 2 plain foundry grades are now on a minimum basis of \$15, delivered, the \$14.75 quotation being eliminated owing to recent heavy sales of low grade iron at about that figure. While there has been little local movement in forge iron for rolling mill purposes, a sale of 10,000 tons for extended shipment at about the current market has been made for delivery outside this district. A slightly better volume of business in Virginia foundry grades is reported. Sales have been made into and through the third quarter, at \$13, Virginia furnace, for No. 2 X foundry. One sale of upward of 1000 tons of Virginia low grade iron to a Delaware River pipe foundry is noted. While the movement in steel making irons is not active, some inquiry is before the trade from Eastern consumers. One sale of 6000 tons of basic for third quarter shipment at \$15.10, delivered, is reported. In this instance a favorable freight rate, as well as other conditions, was an important factor. The recently reported sales of Bessemer and low phosphorus pig iron to a local consumer represented 6000 tons of the former and 5000 tons of the latter grade. Further inquiries for low phosphorus iron are noted and moderate sales have been made within the range of quoted prices. More general urgency for delivery on contracts, both for foundry and steel making iron, are reported. Consumption is evidently on a better basis and melters are urging deliveries on contracts, rather than place further orders at the prevailing slightly higher prices. Standard brands for either prompt or third quarter shipment are quoted as follows, delivered in buyers' yards in this district:

|  |                    |
|--|--------------------|
| Eastern Pennsylvania No. 2 X foundry ..... | \$15.25 to \$15.50 |
| Eastern Pennsylvania No. 2 plain .....     | 15.00              |
| Virginia No. 2 X foundry .....             | 15.80 to 16.00     |
| Virginia No. 2 plain .....                 | 14.55 to 14.75     |
| Gray forge .....                           | 14.50 to 14.75     |
| Basic .....                                | 15.25              |
| Standard low phosphorus .....              | 19.75 to 20.00     |

**Ferroalloys.**—While there has been but little business in ferromanganese other than small prompt lots in this district sellers report considerable inquiry and some sales at \$48.50, Baltimore, for Western shipment, principally for forward delivery. There is still a scarcity, shipments from abroad not being large enough as yet to cover existing contracts, and small sales to tide consumers over are made at prices ranging from \$55 to \$60, seaboard, and on broken lots even higher prices prevail. The demand for both 50 per cent. and furnace grades of ferrosilicon has been quiet.

**Billets.**—The market is strong. A very fair business in rolling billets is coming out, small lots for prompt shipment usually commanding the top of the market. Contracts covering varying quantities for third quarter delivery on both rolling and forging steel are being entered and specifications against contracts are coming out quite freely. Eastern mills continue to operate at close to capacity and have a very satisfactory volume of business on their books. Prices are firm, \$23.40 to \$24.40, delivered here, being quoted for ordinary basic open hearth rolling billets, although the inside quotation is not always available. Forging billets are quoted on a basis of \$28.40, delivered here, against ordinary specifications.

**Plates.**—A good volume of miscellaneous business is being received by Eastern mills, which continue to operate at close to full capacity, the scarcity of labor still restricting in a measure the productive rate. Specifications against boat, structural and tank plate orders are heavy and a good volume of inquiry is before the trade,

including plates for several vessels in addition to those recently figured on. The general tone of the market is good and prices are more generally maintained at 1.40c. minimum for ordinary plates, delivered in this vicinity.

**Structural Material.**—A better volume of both small and moderate business has developed, specifications against orders have been heavier and Eastern mills are taking a more determined stand on the matter of prices, 1.40c., delivered here, being the more general quotation for plain shapes. The McClintic-Marshall Construction Company closed long pending negotiations for the addition to one of the Cramp Shipbuilding Company shops, involving 1500 tons. The inquiry for the new hotel at Thirteenth and Chestnut streets is held up pending some revision in the plans. Fabricators have received plans and are figuring on the inquiry of the Chesapeake & Ohio Railroad for a new pier at Newport News, Va., which is estimated to require from 8000 to 10,000 tons. Several moderate building propositions are ahead in this vicinity, while some good contracts are under negotiation for buildings in the South.

**Sheets.**—Eastern mills continue to receive a very satisfactory volume of current business and are operating at full capacity. Orders come out freely and considerable urgency for prompt delivery is noted. A very fair business in Western sheets is reported, with specifications in good volume. Prices, while unchanged, are strong, Western No. 28 sheets for delivery in this vicinity being quoted at 2.05c. to 2.10c., while Eastern mills making smooth, loose rolled sheets easily obtain  $\frac{1}{4}$ c. to  $\frac{1}{2}$ c. per lb. advance.

**Bars.**—The market is stronger, although the volume of business moving continues light. Eastern makers are in instances holding firmly at 1.35c. to 1.37 $\frac{1}{2}$ c., delivered, for ordinary bars, although 1.30c. can still be done in some cases if the specifications are considered desirable. A moderate volume of new business in steel bars is moving at 1.35c., delivered here, while specifications against old contracts at lower prices are coming to the mills quite freely.

**Coke.**—Consumers of furnace coke are apparently not yet prepared to place second half contracts at prices asked by makers, which range from \$2.25 to \$2.50, at oven, for the better grades. In the meantime odd spot lots continue to be picked up at prices around \$2.10 to \$2.20. A fair movement in foundry coke is noted, with moderate contracts at \$2.50 to \$2.55, at oven, while prompt coke has been available at about \$2.40. The following range of prices, per net ton, about represents the market for deliveries in this district:

|                                  |                  |
|----------------------------------|------------------|
| Connellsville furnace coke ..... | \$4.25 to \$4.60 |
| Connellsville foundry coke ..... | 4.65 to 4.85     |
| Mountain furnace coke .....      | 3.85 to 4.20     |
| Mountain foundry coke .....      | 4.25 to 4.45     |

**Old Material.**—Very little buying by consumers is reported. One large consumer of heavy melting steel is still taking on strictly No. 1 material at \$13.50, delivered, although the majority are covered for near future needs. More business has been moving between dealers to cover contracts previously entered. Little movement in rolling mill grades is noted. A waiting market has developed in nearly all grades, although prices are strong and generally unchanged. The following range of prices about represents the market for prompt deliveries in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate varying from 35c. to \$1.35 per gross ton:

|   |                    |
|---|--------------------|
| No. 1 heavy melting steel scrap and crops ..... | \$13.50 to \$14.00 |
| Old steel rails, rerolling (nominal) .....      | 14.75 to 15.25     |
| Low phosphorus heavy melting steel scrap .....  | 16.25 to 16.75     |
| Old steel axles .....                           | 17.00 to 17.50     |
| Old iron axles (nominal) .....                  | 23.00 to 23.50     |
| Old iron rails (nominal) .....                  | 16.50 to 17.00     |
| Old car wheels .....                            | 14.00 to 14.50     |
| No. 1 railroad wrought .....                    | 15.75 to 16.25     |
| Wrought iron pipe .....                         | 12.50 to 13.00     |
| No. 1 forge fire .....                          | 12.00 to 12.50     |
| No. 2 light iron (nominal) .....                | 7.00 to 7.50       |
| Wrought turnings .....                          | 10.00 to 10.50     |
| Cast borings .....                              | 9.50 to 10.00      |
| Machinery cast .....                            | 13.75 to 14.25     |
| Railroad malleable (nominal) .....              | 12.00 to 12.50     |
| Grate bars, railroad .....                      | 10.50 to 11.00     |
| Stove plate .....                               | 10.50 to 11.00     |

## Boston

BOSTON, MASS., May 27, 1912.

**Old Material.**—The market shows no change, neither in prices nor in demand. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points, taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential

for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

|                                    |                    |
|------------------------------------|--------------------|
| Heavy melting steel .....          | \$10.25 to \$10.75 |
| Low phosphorus steel .....         | 11.45 to 11.95     |
| Old steel axles .....              | 14.00 to 14.50     |
| Old iron axles .....               | 17.00 to 18.00     |
| Mixed shafting .....               | 13.00 to 13.50     |
| No. 1 wrought and soft steel ..... | 10.00 to 10.50     |
| Skeleton (bundled) .....           | 8.25 to 8.75       |
| Wrought iron pipe .....            | 9.25 to 9.75       |
| Cotton ties .....                  | 7.75 to 8.25       |
| No. 2 light .....                  | 4.50 to 5.00       |
| Wrought turnings .....             | 7.25 to 7.75       |
| Cast borings .....                 | 6.25 to 6.75       |
| Machinery, cast .....              | 12.50 to 13.00     |
| Malleable .....                    | 8.75 to 9.25       |
| Grate bars .....                   | 6.00 to 6.50       |
| Stove plate .....                  | 8.00 to 8.50       |
| Cast iron car wheels .....         | 11.75 to 12.00     |

## Cincinnati

CINCINNATI, OHIO, May 29, 1912.—(By Telegraph.)

**Pig Iron.**—The general tone of the market shows some improvement, but not many orders are being booked in this territory. Malleable is fairly active and several sales are reported to Central Western consumers at \$13.25, Ironton, for last half. Northern No. 2 foundry is weak, and while the nominal quotation is \$13.50, Ironton, it can be obtained around \$13.25 at furnace for last half, and a small tonnage is available for prompt movement as low as \$13. The Southern situation continues to gain strength and so far as is known \$11, Birmingham, is the absolute minimum that any producer is willing to take. Several furnaces will accept this price for third quarter, but the majority are holding out for \$11.25 to \$11.50. A few sales were made to Indiana melters of Southern foundry iron, but the total tonnage involved was below normal. A central Ohio consumer bought 500 tons of Southern No. 2 foundry at \$11 for last half, but another buyer was compelled to pay 25c. more for a similar tonnage in order to obtain his special brand. Michigan has furnished a number of customers lately, and there are a few attractive deals yet to be closed in that State. Southern charcoal iron is in better demand and the price continues to harden. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton we quote, f.o.b. Cincinnati, as follows, for prompt shipment:

|   |                    |
|---|--------------------|
| Southern coke, No. 1 foundry and 1 soft ..... | \$14.75 to \$15.00 |
| Southern coke, No. 2 foundry and 2 soft ..... | 14.25 to 14.50     |
| Southern coke, No. 3 foundry .....            | 14.00              |
| Southern coke, No. 4 foundry .....            | 13.75              |
| Southern gray forge .....                     | 13.75              |
| Ohio silvery, 8 per cent, silicon .....       | 17.20 to 17.70     |
| Lake Superior coke No. 1 .....                | 14.70              |
| Lake Superior coke No. 2 .....                | 14.45              |
| Lake Superior coke No. 3 .....                | 14.20              |
| Basic, Northern .....                         | 14.45              |
| Standard Southern car wheel .....             | 25.25 to 25.50     |
| Lake Superior car wheel .....                 | 19.00              |

(By Mail)

**Coke.**—Southern Ohio pig iron producers are very slow in covering for their future supply of coke. Many contracts expire July 1, and it is customary to renew them at least 60 days before expiration, but this year has proved an exception. The prices that coke producers are asking are considered prohibitive, but it is now almost the general belief that the consumer will be compelled to contract at present quotations. In the Connellsville district furnace coke is quoted all the way from \$2.30 per net ton at oven to \$2.50 on contract business, but it is possible to obtain prompt shipment material about 10c. to 15c. below the figures named. Wise County and Pocahontas leading brands are quoted around \$2 to \$2.15 for prompt movement, and average about 15c. a ton higher on contract business. Foundry coke is moving slowly, the largest recorded sale being a lot of 200 carloads for last half shipment at \$2.70, Connellsville. This practically represents the average price on 72-hr. brands in all three districts.

**Finished Material.**—With the exception of a better demand for structural material and railroad spikes and track bolts, there is no change in market conditions. Specifications on contracts are excellent and no mill agency has any complaint to make about the holding up of shipments; on the contrary, in a number of cases it is difficult to make deliveries on time. Steel bars are firm at 1.20c., Pittsburgh, and structural material at 1.25c. Warehouse quotations are 1.65c. and 1.70c. to 1.75c. respectively. The demand for galvanized sheets is very good.

**Old Material.**—Another lull is reported, but local dealers expect an improvement before July 1. Railroad offerings are heavier than usual, but it appears difficult for the buyer and seller to get together; hence transactions are lighter than usual. The minimum figures



given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations the selling prices f.o.b. at yards:

| Per Gross Ton.                     |                  |
|------------------------------------|------------------|
| Bundled sheet scrap.....           | \$9.00 to \$9.50 |
| Old iron rails.....                | 13.00 to 13.50   |
| Relaying rails, 50 lb. and up..... | 20.25 to 21.25   |
| Rerolling steel rails.....         | 11.25 to 11.75   |
| Melting steel rails.....           | 10.25 to 10.75   |
| Heavy melting steel scrap.....     | 10.25 to 10.75   |
| Old car wheels.....                | 12.25 to 13.00   |

| Per Net Ton.                          |                    |
|---------------------------------------|--------------------|
| No. 1 railroad wrought.....           | \$10.75 to \$11.25 |
| Cast borings.....                     | 6.50 to 7.00       |
| Steel turnings.....                   | 6.50 to 7.00       |
| No. 1 cast scrap.....                 | 11.00 to 11.50     |
| Burnt scrap.....                      | 7.75 to 8.25       |
| Old iron axles.....                   | 16.25 to 16.75     |
| Locomotive tires (smooth inside)..... | 12.00 to 12.50     |
| Pipes and flues.....                  | 7.25 to 7.75       |
| Malleable scrap.....                  | 8.75 to 9.25       |
| Railroad tank and sheet scrap.....    | 6.75 to 7.25       |

## Birmingham

BIRMINGHAM, ALA., May 27, 1912.

**Pig Iron.**—The Southern iron market has gone through another uneventful week, but the tone is steady and strong with a decided tendency to approach the \$11.50 basis for the remainder of the year when and if active buying resumes. One leading interest is not seeking orders for delivery prior to the fourth quarter, being well sold into the third, and stands pat on \$11.50. The Republic Iron & Steel Company continues lacking of No. 2 foundry and soft and the lower grades, reporting small sales during the week, with nothing under \$11.50. One lot of 2500 tons of analysis iron was sold at a price above market quotations. The Sloss-Sheffield Steel & Iron Company is selling third quarter at \$11.25 and fourth quarter at \$11.50 and is reported as selling its make straight along and expecting to see its former stock of 120,000 tons reduced to 45,000 tons during the month. It is operating three of its seven furnaces. All accumulations are decreasing, and it will soon be a case of from furnace to consumer. There is an unconfirmed report of the sale of 1200 tons at \$11 for delivery the remainder of the year. A well-posted broker says it is clearly an \$11.25 to \$11.50 market. Several brokers report small sales at \$11.50. One important producer is not quoting fourth quarter iron. It makes a practice of not naming prices that far ahead. Neither makers nor buyers seem in a hurry to anticipate. Last week's quotations are continued without change, but it must be borne in mind that except charcoal iron they are the absolute minimum, with important concerns asking 25c. to 50c. above the quotations. Charcoal iron continues to sell in small lots at \$22 to \$22.50 and sometimes \$23. Prices f.o.b. cars Birmingham on this basis are as follows:

|                                   |                  |
|-----------------------------------|------------------|
| No. 1 foundry and No. 1 soft..... | \$11.50          |
| No. 2 foundry and No. 2 soft..... | 11.00            |
| No. 3 foundry.....                | 10.50            |
| No. 4 foundry.....                | 10.00            |
| Gray forge.....                   | 9.75             |
| Basic.....                        | 10.50            |
| Charcoal iron.....                | \$22.00 to 22.50 |

**Cast Iron Pipe.**—The cast iron pipe makers report plants as very active, a number of small orders coming in steadily and a disposition to advance prices by slow stages. They do not care to change the quotations of last week, but admit the price climbing. The pending inquiry for 1700 tons of gas pipe is reported as not yet placed. Owing to improved railroad conditions shipments are easier. Prices quoted f.o.b. Birmingham are: 4 to 6, \$23; 8 to 12, \$22.50; over 12-in., average, \$21.50.

**Old Material.**—It has been a quiet week in old material. The demand for No. 1 wrought is reported as having fallen off, while that for stove plate has improved. Inquiries are good, especially from the East. Sales in the week were largely in nearby territory, a Chattanooga firm taking a good quantity of stove plate. Dealers quote the following prices, per gross ton, f.o.b. Birmingham:

|                                 |                    |
|---------------------------------|--------------------|
| Wrought iron car axles.....     | \$16.00 to \$17.00 |
| Old steel axles.....            | 14.50 to 15.50     |
| Old iron rails.....             | 14.50              |
| No. 1 railroad wrought.....     | 12.50 to 13.00     |
| No. 2 railroad wrought.....     | 11.50              |
| No. 1 country wrought.....      | 10.00 to 10.50     |
| No. 2 country wrought.....      | 9.00 to 9.50       |
| No. 1 machinery.....            | 8.50 to 9.00       |
| No. 1 steel.....                | 9.50 to 10.00      |
| Tram car wheels.....            | 9.50 to 10.00      |
| Standard car wheels.....        | 11.00 to 11.50     |
| Light cast and stove plate..... | 8.00 to 8.50       |

**Coal and Coke.**—Coal is easing off owing to the approach of summer. Fertilizer and oil mills will be idle for 60 days and power plants are using less steam

coal. Prices are somewhat lower, although no significant cuts in prices are expected. The general summer demand will be up to standard and as soon as the flood situation in the lower Mississippi Valley is entirely removed there will be large shipments of domestic coal to store up. Some West Virginia coke is coming in on the basis of \$2.50 at oven and \$1.75 freight rate; total, \$4.25. Alabama foundry coke is selling at \$3.25 to \$3.50 at oven with 35c. to 50c. freight. The margin is a close one, but is slightly against the West Virginia product.

## St. Louis

ST. LOUIS, MO., May 27, 1912.

A general increase in business is to be noted, though with the exception of one or two items the gain has been in the number of orders rather than the size. However, the total has run to good figures and with prices excellently held. The tendency generally is toward advances, as present quotations, especially on pig iron, continue only through consent of makers for each separate order.

**Pig Iron.**—Varying conditions are reported by furnace representatives, some having had large business, others average and a few light aggregates, but the total is better than for some weeks. The largest sale was of 10,000 tons of Southern basic to a local steel foundry, which found the variance between Northern and Southern so great as to leave no choice from the price standpoint. Northern basic in this market stands at about \$16 delivered, and Southern \$1 to \$1.25 cheaper. In No. 2 Southern foundry the week's business was good in small orders, with total sales of perhaps 5000 to 6000 tons. Consumers insist on early shipment, indicating that supplies are being melted as rapidly as received. On Southern iron, \$11, Birmingham, is the lowest possible for No. 2 with very little at that except for immediate delivery, \$11.25 being sought and even \$11.50, the latter for last quarter invariably. No. 4 is still hard to get. Malleable is not much sought at present. Northern foundry, Lake Superior charcoal and other irons are quiet, but firm.

**Coke.**—The coke movement is almost on the hand-to-mouth basis and interests known to have contracts expiring June 1 are not yet in the market with inquiries for future delivery, apparently depending on current prices and shipments. One representative reports a sale of 6000 tons. Most agencies of Connellsville and West Virginia producers are under instructions to make no price lower than \$2.50 at oven for best 72-hour, for immediate shipment, future deliveries being held at \$2.75. By-product coke is unchanged and quiet.

**Old Material.**—Little was done the past week. The Chicago & Eastern Illinois list went at high prices, dealers remaining firm in their convictions. Consumers are looking for bargains, but dealers think it only a question of time until the existing quotations are accepted and purchases made. The independence of the dealers is aided by the fact that St. Louis is out of line with some other markets and material can be shipped away from here at a profit. This is especially true of steel scrap. Small offerings during the week went at high prices. We quote dealers' prices, f.o.b. St. Louis, as follows:

| Per Gross Ton.   |                    |
|--|--------------------|
| Old iron rails.....  | \$14.00 to \$14.50 |
| Old steel rails, re-rolling.....                             | 12.00 to 12.50     |
| Old steel rails, less than 3 ft.....                         | 12.00 to 12.50     |
| Relaying rails, standard section, subject to inspection..... | 22.00 to 22.50     |
| Old car wheels.....  | 13.00 to 13.50     |
| Heavy melting steel scrap.....                               | 12.00 to 12.50     |
| Frogs, switches and guards cut apart.....                    | 12.00 to 12.50     |

| Per Net Ton.                                |                    |
|---|--------------------|
| Iron fish plates.....                       | \$13.00 to \$13.50 |
| Iron car axles.....                         | 18.00 to 18.50     |
| Steel car axles.....                        | 16.00 to 16.50     |
| No. 1 railroad wrought.....                 | 12.50 to 13.00     |
| No. 2 railroad wrought.....                 | 11.75 to 12.25     |
| Railway springs.....                        | 10.50 to 11.00     |
| Locomotive tires, smooth.....               | 12.50 to 13.00     |
| No. 1 dealers' forge.....                   | 8.50 to 9.00       |
| Mixed borings.....                          | 6.75 to 7.25       |
| No. 1 busheling.....                        | 9.50 to 10.00      |
| No. 1 boilers, cut to sheets and rings..... | 8.00 to 8.50       |
| No. 1 cast scrap.....                       | 11.00 to 11.50     |
| Stove plate and light cast scrap.....       | 8.50 to 9.00       |
| Railroad malleable.....                     | 10.00 to 10.50     |
| Agricultural malleable.....                 | 8.50 to 9.00       |
| Pipes and flues.....                        | 8.00 to 8.50       |
| Railroad sheet and tank scrap.....          | 8.00 to 8.50       |
| Railroad grate bars.....                    | 9.00 to 9.50       |
| Machine shop turnings.....                  | 7.50 to 8.00       |

**Finished Iron and Steel.**—In structural material the shops are generally very busy, but chiefly on small orders, with quick shipment required. Steel deliveries generally becoming more and more extended. The only large inquiry in the market is for 1000 tons of re-

inforcing bars for use in a hospital contract at Cincinnati held by a local firm. Plates are extremely firm, hard to get and at a premium for immediate shipment. Bars are in fair demand at steady prices. The agricultural interests ask quick shipment, while the wagon makers are rather quiet in their action, presumably because of the flood conditions to the south. In standard steel rails the Chicago & Eastern Illinois formally closed the 10,000 tons previously reported, while about 25,000 to 30,000 tons from various roads in this territory is under negotiation, with probabilities in favor of early closing. Track fastenings continue in strong request and the business to date is about equal to an entire normal year. Light rails are very quiet, this being the season of light demand.

## Buffalo

BUFFALO, N. Y., May 28, 1912.

**Pig Iron.**—Inquiry keeps up in good volume from territory tributary to this market and a fair number of sales have been made, totaling for the week about 20,000 tons. There is evidence that the rate of consumption by melters is increasing and interest is developing in every kind of iron—foundry, forge, malleable, pipe iron, charcoal, high silicon and high phosphorus. Some consumers who were supposed to have covered for their last half requirements are again in the market and requesting third quarter delivery. Prices are stiffer and there are indications that a further advance may be seen. Two of the larger producers claim to be maintaining a minimum of \$14 for No. 2 X with a range of \$14.25 to \$14.50 for No. 1 foundry, malleable and basic, and one furnace interest states that it is restricting its quotations to third quarter. We quote as follows for current quarter and last half, f.o.b. Buffalo:

|  |                    |
|--|--------------------|
| No. 1 X foundry.....                       | \$14.00 to \$14.50 |
| No. 2 X foundry.....                       | 13.75 to 14.25     |
| No. 2 plain.....                           | 13.50 to 14.00     |
| No. 3 foundry.....                         | 13.50 to 13.75     |
| Gray forge.....                            | 13.25 to 13.50     |
| Malleable.....                             | 14.25 to 14.50     |
| Basic.....                                 | 14.25 to 14.50     |
| Charcoal according to brand and analysis.. | 15.75 to 17.00     |

**Finished Iron and Steel.**—Inquiry for immediate and early delivery is good; but largely unsatisfied owing to the filled up condition of the mills. Deliveries on plates and shapes are becoming further extended, some specifications requiring three or four months time. Steel bar deliveries are also running further behind, although some mills are promising delivery in four to six weeks. Prices are firm with prospects of a further advance in some lines before July 1. In one or two instances buyers have tried to place large orders for steel bars at slightly less than current schedule, but without success, one such order being for 2000 tons. The demand for concrete reinforcing bars is heavy. One manufacturing plant addition at Niagara Falls will require 200 tons of corrugated bars; another addition there, 350 tons; a Buffalo flour mill and grain elevator a like amount, and an extensive plant under contract at Niagara Falls, Ont., will also require several hundred tons of reinforcing bars. In fabricated structural lines a large number of small and moderate sized jobs are on the market for figures, making a good aggregate, and prices have an upward tendency. In fact prices now being realized are considerably better than were obtained a few weeks ago. Bids will soon be taken for the steel for an addition to the factory of the Hewitt Rubber Company, Buffalo, 200 tons; for a surgical ward addition to the Sisters of Mercy Hospital, Buffalo, 100 tons, and for steel for a theater and office building at Binghamton requiring a considerable tonnage. The Chas. F. Ernst Sons Iron Works has received a contract for the fabrication and erection for the remodeling of the Washington Market, Buffalo. The American Bridge Company recently took the contract for the steel work for the new addition to the McCurdy-Norwell Company department store, Rochester, the revised plans requiring 500 tons of steel. The chief engineer of the War Department, Washington, has awarded the contract for a steel bascule bridge over the United States ship canal at the foot of Ferry street, Black Rock Harbor, Buffalo, to the Great Lakes Dock & Dredge Company of Chicago, which was low bidder at \$126,871. General contract for the erection of the plant of the Ontario Pulp & Paper Mills at Thorold, Ont., has been awarded to the Lackawanna Bridge Company, Buffalo, on which 500 tons of fabricated steel will be required.

**Old Material.**—The market for the week has been quiet and featureless with very light transactions by local mills and foundries and only a moderate inquiry from outside districts. In fact trade in this section has not been sufficient to test prices or establish a price

schedule. We therefore quote last week's prices unchanged, per gross ton, f.o.b. Buffalo:

|  |                    |
|--|--------------------|
| Heavy melting steel.....                     | \$12.75 to \$13.25 |
| Low phosphorus steel.....                    | 15.75 to 16.00     |
| No. 1 railroad wrought.....                  | 14.00 to 14.75     |
| No. 1 railroad and machinery cast scrap..... | 13.50 to 14.00     |
| Old steel axles.....                         | 16.50 to 17.25     |
| Old iron axles.....                          | 21.00 to 21.50     |
| Old car wheels.....                          | 12.50 to 13.00     |
| Railroad malleable.....                      | 11.50 to 12.25     |
| Boiler plate, sheared.....                   | 13.75 to 14.25     |
| Locomotive grate bars.....                   | 9.50 to 11.25      |
| Wrought pipe.....                            | 9.50 to 10.00      |
| Tank iron.....                               | 10.00 to 10.25     |
| Wrought iron and soft steel turnings.....    | 8.00 to 8.50       |
| Clean cast borings.....                      | 7.00 to 7.50       |

## The German Iron Market

Continued Activity and Some Advances

BERLIN, May 17, 1912.

The activity previously described continues in all departments unabated. Prices still show an upward tendency. The gas and boiler tube makers voted a slight advance last week and at the same time it was announced that an agreement had been made with outside manufacturers to raise prices by 7½ per cent. in the European market outside of Germany. Commercial screws have also been raised 1 to 4 per cent. From the Belgian market further advances of export prices are reported. The rise is 1 shilling a ton on iron and basic steel bars, bringing the prices up to 116 to 118 shillings, while plates and sheets of all classes were raised 2 shillings to 144 to 146 shillings for thin sheets and 133 to 135 shillings for heavy plates. These prices correspond with advances recently made in England.

The Steel Works Union is to meet a week hence for the purpose, among other things, of adopting a price scale for the third quarter on structural shapes and semi-finished steel. It is expected that no change will be made in the former, but that something will be done in the latter. It is proposed to reduce the price in the home market 5 marks a ton and to discontinue the export drawback of 7½ marks, which is equivalent to an advance of 2½ marks on material to be used in making products for the export trade. It is not yet clear whether home consumers are to have the benefit of this reduction of 5 marks.

The April shipments of the Steel Works Union amounted to 468,300 tons, compared with 440,400 tons in April, 1911, and 669,900 tons in March, 1912. The latter figure, as usual, was unduly swollen owing to the completion of the business year with March and the rush of shipments in winding up engagements. Shipments of steel rails and ties in April reached only 151,300 tons, which denotes an unusually light movement, and this was also true of semi-finished material, of which only 130,000 tons was shipped. But the reduction is accounted for by the heavy shipments in March.

### Syndicate Operations

Matters of organization are still in the forefront of interest in the trade. The Union will open negotiations soon for the renewal of the international agreements respecting steel rails and structural shapes. It is reported that a committee is about to be appointed to open negotiations for the organization of the bar trade, but it is mentioned at the same time that the mills concerned have very slight hopes that anything will come of this movement. The Wire Rod Association will lapse with this year and negotiations for its prolongation are about to begin. It is expected that very grave difficulties will be encountered, and it may be regarded as doubtful whether the renewal will be agreed upon. When this organization was last renewed in 1907 the difficulties raised on all sides seemed well nigh insurmountable, and it is believed that the situation will be still more difficult this time, owing to the fact that a number of the great establishments of the Union have taken up the manufacture of rods. These great concerns feel more than ever the need of a safety valve in B products in view of their enlarged capacity for producing steel material, and it will not be easy to get them to obligate themselves to produce any fixed quantity of rods. This applies with equal force to bars, plate and other finished products.

The position of the hardware trade has materially improved. Good news is coming from nearly all branches of the trade. Numerous shops will soon have to begin working overtime, and not a few are compelled to ask for postponement of deliveries on contracts. Hence it is believed that the quiet season usual in the summer months will this year be reversed and that there will be no interruption to the present activity. The association of saw and machine knife manufacturers at Remscheid has voted a 5 per cent. advance in



prices and a similar movement is on foot among the makers of drills, axes and locks.

The great Phoenix Company is planning an extensive building programme and an increase of its capital by about 15,000,000 marks is expected.

## More Inclined to Forward Buying

British Iron and Steel Markets Quiet, but the Tendency Upward

(By Cable)

MIDDLESBROUGH, ENGLAND, May 29, 1912.

The Whitsuntide holidays have interrupted business, but the suspension of manufacturing operations was unusually restricted. Consumers are well covered temporarily, but there is a growing inclination to enter into forward contracts. The general tendency continues good. Sellers are reluctant to commit themselves very far at present prices. There is a continued shortage of forge and foundry irons, especially in the Midlands.

The United States Steel Corporation appears not to be a willing seller of semi-finished steel, but American independent companies are offering open hearth billets at 97s. 9d. c.i.f. Glasgow. German steel bars are easier at £5 16s. to £5 17s., f.o.b. Antwerp, owing to selling by merchant, and here the rise seems temporarily overdone. We quote as follows:

Cleveland pig iron warrants (closing Tuesday), 54s. 1d., against 53s. 11½d. one week previous.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 54s. 6d.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 17s. 6d.

German 2-in. billets, f.o.b. Antwerp, 100s.

German basic steel bars, f.o.b. Antwerp, £5 16s. to £5 17s.

Steel bars, export, f.o.b. Clyde, £7 12s. 6d.

Steel joists, 15-in. export, f.o.b. Hull or Grimsby, £6 17s. 6d.

Steel ship plates, Scotch, delivered local yard, £7 14s. 9d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 5s.

Steel rails, export, f.o.b. works port, £6 7s. 6d.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 14s. 7½d., October-December.

## New York

NEW YORK, May 29, 1912.

**Pig Iron.**—There has been a scattering business in foundry iron in New Jersey, Connecticut and the Hudson River Valley through local offices in the past week, but as has already been pointed out the buying movement has plainly subsided. A comparatively quiet market is looked for for some weeks. Eastern Pennsylvania furnaces represented in New York have done a fair business but largely in territory tributary to Philadelphia. Two pipe interests have made further purchases in the past week from Pennsylvania furnaces, amounting to about 15,000 tons. There is continued inquiry also for basic iron and a sale reported in New Jersey was on a delivered basis, which would be equivalent to \$15.25 in the Philadelphia district. Most eastern Pennsylvania furnaces are holding for \$15.25 delivered as a minimum and some are asking \$15.50. Foundry iron in the Lehigh and Schuylkill valleys seems a trifle firmer, and as high as \$15 at furnace for No. 2 X has been done. Sales of foundry iron through New York offices in the past week have amounted to from 15,000 to 20,000 tons, largely for delivery in the last half. Buffalo furnaces are rather firmer. Virginia iron is inactive, furnaces there holding as a rule for \$13 for No. 2 X. We quote as follows for Northern iron at tidewater: No. 1 foundry, \$15.25 to \$15.50; No. 2 X, \$15 to \$15.25; No. 2 plain, \$14.75 to \$15. Southern iron is quoted at \$15.50 to \$15.75 for No. 1 foundry and \$15 to \$15.25 for No. 2 foundry.

**Finished Iron and Steel.**—The reduced volume of new demand which was noted in the local market two or three weeks ago is still a leading feature of the present condition. There is a preponderance of belief that neither jobber nor consumer is storing up material, and this fact is taken to indicate no special fear on the part of the buyer that there will be any marked upward tendency in prices. Many have, of course, been operating at the low prices of 1911 for the first half of the year, and have material at the recent scale for the third quarter, but it does not appear that buyer and seller have come together for the fourth quarter,

except in the case of the agricultural machinery buyers. There has been some demand for fourth quarter consideration, but the seller is loath to close and the buyer seems hardly willing to commit himself. There is an absence of information that bars are anything but strong at 1.20c., Pittsburgh, or that plates and plain structural shapes are not easily commanding 1.25c., Pittsburgh. The only shading noted is that involved in the special competition for the very large structural contracts recently placed and pending. Track fastenings and accessories are conspicuous for the continued large volume moving. Railroad inquiries are numerous also for small bridge requirements. Bar iron is firmer and best refined iron is being marketed successfully by at least one large producer at 1.25c. at mill, bringing about 1.35c. New York. Among the awards in structural lines are included two buildings going to Levering & Garrigues, each of 1300 tons, one at Twenty-ninth street and Fourth avenue and the other at 16 West Forty-fifth street. The Jones & Laughlin Steel Company was awarded the 400 tons for 30 signal bridges for the New York Central. Of the new structural work which has lately come to light is a 2500-ton loft building at 11 East Twenty-sixth street and an eight-story apartment house at Riverside Drive and 141st street, 650 tons. Bids have gone in for a 150-ton bridge for the Lackawanna at Binghamton. The general contract has been placed for the Turkhead building, Providence, requiring about 2000 tons. Quotations are: Steel bars, 1.36c. to 1.41c.; plain structural material and plates, 1.41c. to 1.46c.; bar iron, 1.32½c. to 1.37½c., all New York. Plain material from store, New York, 1.75c. to 1.85c.

**Cast Iron Pipe.**—Nothing has yet developed with regard to the expected heavy purchases of cast iron pipe for the city of New York. While public lettings in the immediate future are few and unimportant, the demand from private water and gas companies maintains a good volume of business. Carload lots of 6 in. are unchanged at \$21, tidewater, per net ton from some makers, while others are firm at \$22 to \$23.

**Old Material.**—Nothing of importance has transpired in this branch of trade. Consumers of steel scrap appear to be well supplied and rolling mills and foundries are only buying moderate quantities as needed. The receivers of a bankrupt dealer are offering 2500 tons of steel scrap, but the terms of sale are not attractive. Dealers' quotations are continued as follows, per gross ton, New York and vicinity:

|   |                    |
|---|--------------------|
| Old girder and T rails for melting..... | \$11.25 to \$11.50 |
| Heavy melting steel scrap.....          | 11.25 to 11.50     |
| Relaying rails .....                    | 20.00 to 20.50     |
| Rerolling rails (nominal).....          | 12.50 to 13.00     |
| Iron car axles .....                    | 21.00 to 21.50     |
| Old steel car axles.....                | 15.00 to 15.50     |
| No. 1 railroad wrought.....             | 13.25 to 13.75     |
| Wrought iron track scrap.....           | 12.00 to 12.50     |
| No. 1 yard wrought, long.....           | 11.50 to 12.00     |
| No. 1 yard wrought, short.....          | 11.25 to 11.50     |
| Light iron .....                        | 5.00 to 5.25       |
| Cast borings .....                      | 7.00 to 7.25       |
| Wrought turnings .....                  | 8.00 to 8.25       |
| Wrought pipe .....                      | 10.25 to 10.75     |
| Old car wheels.....                     | 13.50 to 14.00     |
| No. 1 heavy cast, broken up.....        | 11.75 to 12.25     |
| Stove plate .....                       | 9.00 to 9.50       |
| Locomotive grate bars.....              | 8.75 to 9.25       |
| Malleable cast .....                    | 10.00 to 10.50     |

**Ferroalloys.**—Quotations for 80 per cent. ferromanganese are unchanged at \$48.50, Baltimore, forward delivery. Spot ferromanganese has been sold at \$58, and there is little to be had for immediate shipment, although recent receipts at Philadelphia eased the market somewhat. Labor troubles and difficulties in obtaining ore have hampered foreign makers. Sailings for Baltimore were deferred because of the stevedores' strike in that city. Ferrosilicon, 50 per cent., is quiet at \$70, Pittsburgh.

## Cleveland

CLEVELAND, OHIO, May 28, 1912.

**Iron Ore.**—The general satisfactory condition in the iron and steel trade leads ore firms to look for the sale of considerable amounts of ore in the latter part of the season, as ore will be required for some furnaces now idle that will be blown in but for which ore was not bought in the active buying movement. Some small lot sales are still being made, but the market is generally quiet. Ore firms are well sold up and are satisfied with present tonnage on their books. Shipments are now quite heavy and the figures for May will show a large movement during the month. We quote prices as follows: Old Range Bessemer, \$3.75; Mesaba Bessemer, \$3.50; Old Range non-Bessemer, \$3.05, and Mesaba non-Bessemer, \$2.85.

**Pig Iron.**—While the market generally is not active, considerable foundry iron was sold by local furnaces in the week for shipment to Cleveland and other northern Ohio foundries. These sales range from lots of 100 to 1500 tons. Some of the iron was for spot shipment, but most was for the last half. There is very little pending now in the way of inquiries and sellers look for a quiet market during the next few weeks. Most of the foundry trade appears to be now covered for the last half requirements. The market is very firm and \$13.25, Cleveland furnace, appears to be maintained as the price for No. 2 foundry both for local delivery and for outside shipment. The sales noted for the week were made at that price. We quote as follows for prompt shipment and for last half, delivered Cleveland:

|  |                |
|--|----------------|
| Bessemer .....                             | \$15.15        |
| Basic .....                                | 13.50          |
| Northern No. 2 foundry .....               | 13.50          |
| Southern No. 2 foundry .....               | 13.35          |
| Gray forge .....                           | 12.75 to 13.00 |
| Jackson silvery, 8 per cent. silicon ..... | 17.30 to 17.55 |

**Coke.**—Some contracts for furnace coke for the last half have been placed and several inquiries are pending. There is considerable demand for furnace coke for spot shipment, but very little inquiry for foundry grades. Few consumers have placed contracts for their last half requirements. Prices are firm. Furnace coke is quoted at \$2.35 to \$2.50 per net ton at oven for the last half and about \$2.40 for prompt shipment. We quote 72-hr. foundry coke at \$2.65 to \$2.75 for prompt shipment and contract. Some producers, however, are holding for \$3.

**Old Material.**—The market is more active than for some time and prices are very firm. Heavy steel scrap has advanced 25c. to 50c. a ton and higher quotations are being made on borings, turnings, busheling and some other grades. Some heavy steel scrap has been sold in the past few days at \$12, but dealers are now asking \$12.75 and the market appears to be firm at \$12.50. Railroad wrought is much firmer, sales being reported at \$12.25. The demand for nearly all kinds of scrap is fairly good in small lots. Dealers expect a further advance and are not offering much material at present prices. Dealers' prices, f.o.b. Cleveland, are as follows:

| Per Gross Ton.                        |                    |
|---------------------------------------|--------------------|
| Old steel rails, rerolling .....      | \$12.75 to \$13.00 |
| Old iron rails .....                  | 14.00 to 14.50     |
| Steel car axles .....                 | 17.50 to 18.00     |
| Heavy melting steel .....             | 12.25 to 12.75     |
| Old car wheels .....                  | 13.00 to 13.50     |
| Relaying rails, 50 lb. and over ..... | 22.50 to 23.50     |
| Agricultural malleable .....          | 10.50 to 11.00     |
| Railroad malleable .....              | 12.00 to 12.50     |
| Light bundled sheet scrap .....       | 9.50 to 10.00      |

| Per Net Ton.                                |                    |
|---|--------------------|
| Iron car axles .....                        | \$18.50 to \$19.00 |
| Cast borings .....                          | 7.50 to 7.75       |
| Iron and steel turnings and drillings ..... | 7.50 to 7.75       |
| Steel axle turnings .....                   | 8.50 to 8.75       |
| No. 1 busheling .....                       | 10.75 to 11.00     |
| No. 1 railroad wrought .....                | 12.00 to 12.25     |
| No. 1 cast .....                            | 11.25 to 11.75     |
| Stove plate .....                           | 9.00 to 9.50       |
| Bundled tin scrap .....                     | 11.00 to 11.50     |

**Finished Iron and Steel.**—Demand has improved and specifications continue heavy. The matter of deliveries has become the important feature of the market. Consumers are crowding mills for shipments and most of the mills are getting further behind. Local mills that are able to make prompt shipment on steel bars are picking up considerable business at a premium of \$1 or more a ton. Some of the mills are filled up for so far ahead that they are making no effort to take on additional tonnage. There is considerable inquiry for round lots of billets mostly from Western mills. The market is very firm. Open-hearth billets are quoted from \$21.50 to \$22, Cleveland. Ohio boiler shops generally did not place contracts before the recent advance in prices and several have inquiries out for boiler steel for the last half. Plates are very firm at 1.25c. Pittsburgh. Some structural material has been offered in the local market by a jobber at \$1 a ton below regular prices, but this concession is not affecting general quotations. A good volume of small structural work is coming out and local fabricators are specifying heavy on contracts. The only large contract placed in the week was 1400 tons, taken by the King Bridge Company, Cleveland, for a Nickel Plate Railroad bridge at Buffalo. Four additional oil boats ordered from the American Shipbuilding Company by the Standard Oil Company will require 6000 tons of plates and shapes. Sheets are firm and in good demand. Some contracts are being placed for the third quarter delivery. We quote No. 28 black sheets at 1.90c. to 1.95c. and No. 28 galvanized at 2.90c. to 2.95c. The higher price is being generally maintained for contracts. There is a good demand for hard steel bars and

mills have advanced prices \$1 a ton to 1.20c. for less than car lots, 1.15c. still being quoted for car lots. Forging billets are firmer and sales are being made in carload lots at \$29, Cleveland. The demand for bolts and nuts is quite active and the recent advance in prices is being maintained. There is a good demand for iron bars and prices are firm at 1.25c., Cleveland mills.

## Metal Market

NEW YORK, May 29, 1912.

### The Week's Prices

|         |        | Copper, New York. |        | Cents Per Pound for Early Delivery |                | Lead      |            | Spelter   |            |
|---------|--------|-------------------|--------|------------------------------------|----------------|-----------|------------|-----------|------------|
|         |        | May.              | Lake.  | Electro-lytic.                     | Tin, New York. | New York. | St. Louis. | New York. | St. Louis. |
| 23..... | 16.62½ | 16.50             | 45.37½ | 4.20                               | 4.10           | 6.85      | 6.70       |           |            |
| 24..... | 16.62½ | 16.50             | 46.35  | 4.20                               | 4.10           | 6.85      | 6.70       |           |            |
| 25..... | 16.62½ | 16.50             | .....  | 4.20                               | 4.10           | 6.85      | 6.70       |           |            |
| 27..... | 16.75  | 16.62½            | 46.75  | 4.20                               | 4.12½          | 6.85      | 6.70       |           |            |
| 28..... | 16.75  | 16.62½            | 47.10  | 4.20                               | 4.12½          | 6.90      | 6.75       |           |            |
| 29..... | 16.75  | 16.62½            | 46.00  | 4.20                               | 4.12½          | 6.90      | 6.75       |           |            |

Copper is strong and fairly active at higher prices. Tin reached the 47c. level yesterday, but receded sharply to-day on London advices. Lead is firm and advances are expected. Spelter shows a strong tendency. Chinese and Hungarian antimony are higher.

### New York

**Copper.**—The position of copper has strengthened in the last week and there is no evidence that any backward movement may be expected prior to the issuance of the Copper Producers' statement next month and no change may come then. Electrolytic copper has been sold at 16.62½c. cash, New York, and Lake at 16.75c., cash, New York, and a good business is reported as having been done at near these figures. Various consumers are running full time, using a great deal of copper and were compelled to come into the market. It is confidently expected that the next statistical statement will show a decrease in stocks despite a probable increase in production, because of the large quantities of copper which have gone into export and consumption. It is conceded that we are approaching a point where copper will be scarce; in fact, it is fairly scarce now for early delivery. In some few quarters there is displayed a disposition to doubt the full meaning of the figures issued by the Copper Producers' Association, but this is far from general and the usual sentiment is that copper is in a very strong position. Spot copper is quoted in London to-day at £75 10s. and futures at £76. The exports of copper this month have been 27,697 tons.

**Pig Tin.**—The New York price for pig tin touched 47.10c. yesterday, but declined 1.10c. or to 46c. over night as a result of a drop of over £7 in the London price of spot tin, which closed Tuesday at £214 and was quoted by the first cable to-day at £206 10s. There has been considerable buying activity in the last week, but most of it was between dealers. The market is seriously affected by the London dock strike which has delayed shipments. In New York there is ample stock at the present time, most of which is owned by London, but it is believed that unless the English strike is soon ended the situation will be a tight one in the latter part of June. Hopes are strong, however, that the widespread effects of the English strike will cause its speedy termination and that its greatest effect upon the New York tin market will be premiums over the cost of import. One explanation of the erratic behavior of the London market is that there are a number of June contracts uncovered, and dealers have attempted to protect themselves at a time when London stocks are low. On May 23 about 600 tons of tin was sold here, mostly for June delivery, some for July and August and a small quantity for September. On May 24 and May 27 little was doing, but on May 28 a fair business was done on the Exchange. In the entire week about 1200 tons of tin changed hands. The London price of tin futures to-day was £200. The arrivals of tin this month have been 3481 tons and there is afloat 895 tons.

**Tin Plates.**—Unchanged conditions continue in the market for tin plates at the New York price of \$3.64 for 100 lb. coke plates, as quoted by the lowest sellers.

**Lead.**—Nothing of interest developed in the New York market for lead, the price quoted a week ago, 4.20c., remaining the same, but in St. Louis prices went up gradually and 4.12½c. is now quoted and there has been a fair but in no way excessive demand. Stocks in St. Louis appear to be rather light and persons in close touch with the American Smelting & Refining Company expect that company to advance its price at an early date. Independents are asking 4.22½c. to 4.25c., New York.



**Spelter.**—A fair and steady demand exists for spelter and prices have strengthened at a time of the year when they might have been expected to decline. Spelter is quoted at 6.90c., New York, and 6.75c., St. Louis.

**Antimony.**—The only feature of interest in the antimony market is the higher price quoted for Hungarian and Chinese grades, which are held at 7.20c. Cookson's is unchanged at 8c. and Hallett's at 7.62½c.

**Old Metals.**—Prices have again advanced. Dealers' selling quotations are as follows:

|                                 | Cents per lb.  |
|---------------------------------|----------------|
| Copper, heavy and crucible..... | 15.50 to 15.75 |
| Copper, heavy and wide.....     | 15.00 to 15.25 |
| Copper, light and bottoms.....  | 13.75 to 14.00 |
| Brass heavy.....                | 9.75 to 10.00  |
| Brass, light.....               | 8.25 to 8.50   |
| Heavy machine composition.....  | 12.75 to 13.00 |
| Clean brass turnings.....       | 9.50 to 9.75   |
| Composition turnings.....       | 11.50 to 12.00 |
| Lead, heavy.....                | 4.00           |
| Lead, tea.....                  | 3.75           |
| Zinc, scrap.....                | 5.50           |

#### Chicago

MAY 28.—A decided activity has been displayed in copper and higher quotations seem probable. As a result of the labor difficulties at London tin prices are also up. Old metal quotations have fluctuated slightly in sympathy with the new metal market. We quote as follows: Casting copper, 16.50c.; Lake, 16.75c., in carloads for prompt shipment; small lots, ¼c. to ¾c. higher; pig tin, carloads, 47.50c.; small lots, 48.75c.; lead, desilverized, 4.15c. to 4.20c., for 50-ton lots; corroding, 4.40c. to 4.45c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.95c. to 7.05c. Cookson's antimony, 8.50c., and other grades, 8c., in small lots; sheet zinc is \$8.65 f.o.b. La Salle or Peru, Ill., less 8 per cent. discount, in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14.75c.; copper bottoms, 12.25c.; copper clips, 13.75c.; red brass, 12c.; yellow brass, 9.75c.; lead pipe, 3.90c.; zinc, 4.75c.; pewter, No. 1, 28.50c.; tinfoil, 32c.; block tin pipe, 42c.

#### St. Louis

MAY 27.—The market here has been rather quiet, but prices have been well held. Lead is better at 4.12½c. to 4.15c., with sellers averse to accepting. Spelter is 6.70c. to 6.85c., according to delivery, with sellers firm. Tin is quiet at New York figures plus freight. Lake copper stands at 16.85c. to 17.10c., and electrolytic at 16.37½c. to 16.60c. Cookson's antimony is 8.35c. In the Joplin district ore prices have retained the high level, and zinc blende brought as high as \$58 per ton on 60 per cent. basis, the basis price ranging from \$52 to \$57. Lead ore occupied the center of the stage because of the sharp advance, the top price reaching \$55, which is \$3 better than for several weeks. Calamine was in good demand, with prices unchanged. Miscellaneous scrap has been quiet. We quote: Light brass, 5c.; heavy brass and light copper, 9c.; heavy copper and copper wire, 10c.; zinc, 3.50c.; lead, 3.50c.; pewter, 21c.; tinfoil, 31c.; tea lead, 3c.

L. Vogelstein & Co., 42 Broadway, New York, representing Aron Hirsch & Sohn, Halberstadt, Germany, are distributing a 24-page pamphlet which is the twentieth annual issue of the latter firm's "Statistical Compilations About Copper." The pamphlet gives numerous tables relating to the copper production and consumption of the world and of the several countries, together with tables of prices of copper covering the period from 1900 to 1911, inclusive. A summary of trade conditions states that "as soon as consumption in the United States returns to the normal it is possible and even probable that prices will again be unduly inflated before a substantial increase in production is evidenced," concluding as follows: "Granted immunity from restraint of a political nature, the industrial world will look into the immediate future of the copper industry with confidence."

Alternate stack A of the Warwick Iron & Steel Company, Pottstown, Pa., operated by the Eastern Steel Company, was blown in May 21. This is the new stack, recently built, and will be run on low phosphorus iron. No. 1 furnace continues in operation on basic and foundry grades.

At a meeting of the Engineers' Society of Western Pennsylvania, Pittsburgh, on the evening of May 21, W. E. Hartman, managing engineer of the H. Koppers Company, Joliet, Ill., read a paper on the subject of "By-product Coke Oven Practice."

## Iron and Industrial Stocks

NEW YORK, May 29, 1912.

The stock market has been dull but steady. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

|                          |             |                           |             |
|--------------------------|-------------|---------------------------|-------------|
| Allis-Chalm., com....    | 1 - 1½      | Nat. En. & St., com.....  | 17          |
| Allis-Chalm., pref....   | 24½ - 3½    | Nat. En. & St., pref..... | 93½         |
| Bald. Loco., com....     | 53½ - 54½   | Pressed Steel, com....    | 34½ - 35½   |
| Bald. Loco., pref....    | 107½ - 108  | Pressed Steel, pref....   | 101½ - 101¾ |
| Beth. Steel, com....     | 37½ - 38½   | Railway Spring, com....   | 34½ - 35½   |
| Beth. Steel, pref....    | 70½ - 71½   | Republic, com.....        | 23½ - 23¾   |
| Can, com.....            | 37 - 41     | Republic, pref.....       | 78 - 79     |
| Can, pref.....           | 116 - 118½  | Sloss, com.....           | 50 - 50½    |
| Car & Fdry., com....     | 58½ - 59½   | Sloss, pref.....          | 20½ - 21    |
| Car & Fdry., pref....    | 118½ - 119  | Pipe, com.....            | 56 - 56½    |
| Steel Foundries.....     | 37 - 38     | Pipe, pref.....           | 56 - 56½    |
| Colorado Fuel.....       | 28½ - 29½   | U. S. Steel, com....      | 68½ - 69½   |
| General Electric.....    | 168½ - 172½ | U. S. Steel, pref....     | 110½ - 111½ |
| Gr. N. Ore Cert.....     | 42 - 44     | Westinghouse Elec....     | 73½ - 75    |
| Int. Harvester, com....  | 118 - 123½  | Va. I. C. & Coke.....     | 58½         |
| Int. Harvester, pref.... | 117 - 120   | Chic. Pac. Tool....       | 48 - 48½    |
| Int. Pump, com....       | 29 - 29½    | Cambria Steel.....        | 43 - 43½    |
| Int. Pump, pref.....     | 81          | Lake Sup. Corp.....       | 28½ - 28¾   |
| Lackawanna Steel....     | 30 - 30½    | Warwick.....              | 10½         |
| Locomotive, com....      | 41½ - 42½   | Crucible Steel, com....   | 12½ - 12¾   |
| Locomotive, pref....     | 108 - 109   | Crucible Steel, pref....  | 83½ - 84½   |
|                          |             | Harb. Walk Ref., pref.... | 100         |

#### Dividends Declared

The National Enameling & Stamping Company's regular quarterly, 1¼ per cent. on the preferred stock for each of the last two quarters of the calendar year 1912, payable September 30 and December 31, respectively. Declaration of these dividends at this time is explained by the fact that the company has changed its fiscal year, heretofore ended June 30, to the calendar year, as Federal corporation and state tax returns are based on the calendar year.

Wheeling Steel & Iron Company, regular quarterly, 2 per cent., payable May 30.

#### New Steel Foundry at Hamilton, Ont.

The Steel Castings Syndicate is the name of the company which has been organized through the efforts of C. W. Sherman, Buffalo, N. Y., to build a steel foundry at Hamilton, Ont. Mr. Sherman recently resigned as general manager of the Pratt & Letchworth Company at Buffalo to engage in the new enterprise. The new company has secured a site of eleven acres at Hamilton and as soon as action has been taken by the City Council on certain pending details will begin the work of construction. The plans provide for a main building 520 ft. by 160 ft., a cleaning building 400 ft. by 60 ft., a pattern shop 120 ft. by 60 ft., a pattern storage building 100 ft. by 80 ft., an oil house 50 by 30 ft., which will contain three 1200-gal. tanks for the storage of crude oil. Both Bessemer and open hearth castings will be manufactured. A 20-ton open hearth furnace will be installed and the company has also acquired the rights in Ontario for the Stock oil-fired converter. The plans for the buildings are being prepared by Prack & Perrine, of Hamilton, and their office is the temporary address of the Steel Castings Syndicate.

The National Iron & Steel Company, Houston, Texas, through its vice-president and general manager, I. H. Cohn, has purchased from the Missouri Pacific Railroad 150 miles of relaying rails, most of which will be shipped to the Southwest to be used in the construction of small lines and industrial tracks and interurbans. This company has also placed with Eastern mills in the last thirty days orders for 20,000 kegs of track spikes, several thousand kegs of track bolts and 75,000 pairs of angle bars, and an additional order for 5000 kegs of spikes to the Colorado Fuel & Iron Company.

The Pennsylvania Wire Glass Company, 100 Broadway, New York, is stated to be considering the location of a plant at Norfolk, Va. The company now has a factory at Dunbar, Pa., which will not be abandoned. The cost of distribution from Norfolk to the Eastern market is one of the considerations for establishing a plant on the seaboard. The manufacture of wire glass has had a great development in the last decade.

Corrigan, McKinney & Co., Cleveland, Ohio, emphatically deny the report that they have bought or leased Miami furnace, formerly operated by the Hamilton Iron & Steel Company, at Hamilton, Ohio. The furnace has been idle for some time.

## Personal

W. H. Taylor, president David Williams Company, has gone to Europe, to be absent about a month. He sailed on the Celtic May 23.

August Thyssen, now the most prominent figure in the German iron trade, celebrated his seventieth birthday May 17, and the German newspapers devoted much space to sketches of him. He is the creator of the great iron and coal establishment Deutscher Kaiser, and is a director in a number of other steel and coal companies. Within 10 years he has built additions to the important works mentioned, and added numerous improvements in machinery, so that it is now regarded as one of the model establishments of the German iron trade.

S. Rosenweig, chief engineer of the Erie Iron Works, Erie, Pa., was the speaker at the last meeting of the St. Louis League of Electrical Interests, the subject of his address being "The Application of the Hugo Lentz Engine Principle to Steam Engines."

James E. Howard, of the Bureau of Standards, Washington, D. C., who has been in the Canal Zone for some time on work for the Bureau, will return to Washington early in June.

Andrew Carnegie sailed for Europe May 23.

At the annual meeting of the Machinery Club of the City of New York, held May 28, the following were elected members of the Board of Governors, to serve four years: George A. Post, of the Standard Coupler Company, and president of the club; W. B. Albright, of the Sherwin-Williams Company; E. H. Benners, of the Crown Castings Company; F. W. Iredell, of the C. & G. Cooper Company, and C. B. Croak, of the Lidgerwood Mfg. Company.

George R. Bliss, Jr., treasurer O. C. White Company, Worcester, Mass., has returned from a three months' European trip.

E. C. Fink has been made assistant to the president of the International Motor Company, Fifty-seventh street and Broadway, New York. He recently resigned as a director and assistant to the president of the J. Stevens Arms & Tool Company, Chicopee Falls, Mass., offices which he had held for five years. Previous to going to Chicopee Falls Mr. Fink was with the Prentiss Tool & Supply Company, at the Boston office.

G. E. Randles, vice-president Foote-Burt Company, Cleveland, Ohio, will sail June 1 for a seven weeks' trip abroad. He will visit several European countries in the interest of his company.

W. J. P. Moore, formerly manager of sales in the Pittsburgh district for the Alberger Pump Company, New York City, has been transferred to that office and has been succeeded in Pittsburgh by R. M. Hopkins, formerly of the New York office.

## Obituary

GUSTAVUS F. WHITMAN, vice-president Whitman Agricultural Implement Company, St. Louis, died the past week after an illness of two years, aged 76 years.

JOHN J. COLE, head of the Cole Bros. Lightning Rod Company, and an authority on natural electrical phenomena, died in St. Louis the past week, aged 76 years. His company has one of the largest plants of its kind in the country.

J. S. ANDREWS, vice-president Blair Engineering Company, 17 Battery place, New York City, died suddenly of heart failure May 22, at the Hollenden Hotel, Cleveland, Ohio. He was also formerly connected with the American Steel Foundries, Chicago, and the Commonwealth Steel Company, St. Louis. He was the inventor of the Andrews underframe for freight cars which is sold by the American Steel Foundries.

MILTON B. RICHARDSON, president Barnum Richardson Company, Lime Rock, Conn., died May 17.

Action in the matter of the stock increase of the La Belle Iron Works, Steubenville, Ohio, from \$10,000,000 to \$10,000,000 preferred and \$10,000,000 common has been postponed until June 20. It is understood that some opposition has developed among the stockholders. The report that the company has decided to make some very large additions to its plants at Steubenville is officially denied.

## Pittsburgh and Vicinity Business Notes

The Columbia Steel & Shafting Company, Pittsburgh, maker of turned and polished shafting, cold-drawn screw stock and special shapes, is arranging for a new plant to be located at East Carnegie, near Pittsburgh, and which will practically double its present producing capacity. This will also mean the abandonment of its present plants at Rankin and East Carnegie. It will be some time until the plans are sufficiently perfected to warrant stating what will be required in the way of new machinery and equipment.

The report that the American Steel & Wire Company is erecting permanently, at other works, machinery originally intended for the new wire mill at Corey, Ala., is officially denied. The fact is that when the construction of the works at Corey was suspended, there was considerable machinery being built in Northern shops that was incomplete, and which it was necessary to finish to carry out the contracts. Because of the prospect of this machinery remaining idle for an indefinite period, it was thought inadvisable to send it South for storage in the unfinished condition of the buildings, and it was stored at Sharon, Pa., where the company had suitable accommodations. There is no intention of utilizing any of this equipment permanently at any of the other works of the company. Some of the nail and barbed fence machines have been put to use in some of its works, but only temporarily.

It is officially stated that one-half of the proceeds of the \$2,000,000 bond issue recently made by the Phillips Sheet & Tin Plate Company, Weirton, W. Va., will be used in the building of an open-hearth steel plant and blast furnace at Weirton. Plans have about been completed and active work on the new construction is expected to be started within two or three months.

The Erie City Iron Works, Erie, Pa., through its Pittsburgh office, T. H. McGraw, Jr., district sales agent, has received a contract from the Brier Hill Steel Company, Youngstown, Ohio, for 12 500 hp boilers for the open-hearth plant and two 500 hp. boilers for its rolling mill at Niles, Ohio, known as the Thomas Works, this being one of the finishing mills of the Brier Hill Steel Company. It is understood that the tests made before this order was placed were very severe.

## An American Ingot Iron Pamphlet

The American Rolling Mill Company, Middletown, Ohio, has brought out a most attractive 44-page pamphlet entitled "Public Opinion on American Ingot Iron." It is lavishly illustrated in colors and sets forth the great variety of uses to which the company's product has found its way. Illustrations are given of buildings and other structures covered with American Ingot iron roofing, embankments in which culverts of this material are shown, tank cars for transporting sulphuric acid, transformer tanks, and ranges, stoves and domestic heating furnaces, all largely made of American Ingot iron. Views of the company's three plants are impressive as showing the great extent of its business. Several pages are devoted to reproductions of testimonials. The cover bears an illustration of the tapping of a ladle into ingot molds, with a crowd of interested spectators.

The Duntley Pneumatic Tool Company, organized under the laws of Delaware, with a capital stock of \$100,000, by J. W. Duntley, has made a five-year contract with the Gibbons & Lewis Company, Fond du Lac, Wis., providing for the manufacture of a complete line of pneumatic tools for which the Duntley Mfg. Company, Chicago, will provide the selling organization. J. W. Duntley was the organizer of the Chicago Pneumatic Tool Company and is a brother of the present president of that company, W. O. Duntley.

The Frisco's recent order placed with the American Car & Foundry Company covers slightly over 6000 cars. There are approximately 300 Rodgers ballast cars, the remainder being coal cars. Of the latter 3000 will go to the Chicago & Eastern Illinois and were purchased to take care of a new coal extension, approximately 71 miles long, being constructed from St. Elmo, Ill., to Springfield, Ill., for the purpose of tapping some new coal mines.



## New Publications

**The Metallurgy of Steel:** Vol. I, Metallurgy, by F. W. Harbord; Vol. II, Mechanical Treatment, by J. W. Hall. Fourth Edition, enlarged and revised. Pages, lxxxiv. and 933; 51 folding plates, over 500 illustrations in the text and nearly 80 photomicrographs. Published by Charles Griffin & Co., Ltd., London; J. B. Lippincott Company, Philadelphia.

Since a short time after the first appearance of this book in 1904 it has been recognized as the modern standard reference work on steel in the English language and the standard in all languages on mechanical treatment of iron and steel. Since the publication of the first edition, notable advances have been made in the art which it describes, and this revised edition is brought forth to keep the book abreast with the development of the industry. Opportunity has been taken of the revision to divide the work into two volumes, which is more convenient and serviceable, both in the matter of handling and of logical arrangement and reference. The scheme of the book has not been altered, but additions and modifications have been made in accordance with the advances in the theory and practice of the art. "In the first volume drawings showing the latest modifications in open hearth furnaces and the latest types of gas producers have been introduced, and in the chapter on the Basic Open Hearth recent developments and modifications are described and discussed. The chapter on Electric Smelting has also been brought, as far as possible, up to date. Various additions have been made to what may be called the more theoretical chapters, embodying the results of the latest research in the different branches, and a complete set of new photomicrographs has been prepared to replace those in the last edition. Several plans of various new installations, illustrating the general designs of the most modern works erected in Europe and America, have also been added." The only extensive addition in the section devoted to the Manufacture of Steel is under the Basic Siemens Process, but new data are given under Mechanical Testing, Alloy Steels and Microscopical Examination, while the Heat Treatment of Steel has been changed somewhat.

In Vol. II, on Mechanical Treatment, the changes have been very much more extensive. All the chapters have been added to or modified, and such important recent developments of the mechanical side of iron and steel metallurgy as Use of Steam in Exhaust Steam Turbines, Power from Gas Engines Working with Blast Furnace Gas, Electric Driving of Rolling Mills, etc., are treated at length and a new chapter has been incorporated on the Generation of Steam by Solid Fuel and Waste Gases. The bibliographies in some of the previous chapters have not been brought up to date, which is a regrettable omission because of the value of these lists. Nevertheless, the additions to the text and illustrations of this second volume would alone justify the purchase of the whole work even by those already possessed of the first edition. B. S.

**Machine Shop Practice.** By William J. Kaup. Size,  $5\frac{1}{2} \times 8\frac{3}{4}$  in.; pages, 236; 185 figures. Bound in cloth. Price \$1.25 net. Published by John Wiley & Sons, New York City.

The purpose of this volume is not to deal with the big things of machine shop practice, nor is it designed as a comprehensive treatise on the subject, but mainly to deal with those things which by reason of their smallness have been omitted from previous works on this subject. It is arranged so as to be valuable as a text book in trade, industrial and technical schools, and the apprentice and journeyman machinist can also use it with profit in their daily work. While only the fundamentals are covered, these are treated from the standpoint that enables each to fit into the other and the whole form a ground work. The text is based principally on a series of mimeograph sheets which were tried out by the author for a period of 12 years in connection with his work as head of the department of machine construction of Pratt Institute, Brooklyn, N. Y., and are claimed to do away with all useless energy, the text being so arranged that great efficiency can be secured with the least possible waste of time to the student or the apprentice. The simple forms of machine shop work such as chipping and filing and scraping are first taken up and this is followed by a short chapter on

hand tool work in connection with the speed lathe. After a brief description of the various types of materials employed in machine construction and the reason for their use practice with the various machine tools such as drill presses, planing and shaping machines, lathes and boring and milling machines is taken up. Chapters on the use of measuring instruments, the design of gears and the treatment of tool steel together with instructions in tool making follow, and the last chapter, which is quite comprehensive, is given over to a discussion of the various systems employed in shops for keeping track of work. This chapter is illustrated with a number of suggested forms and a comprehensive index completes the volume.

**Southern Industries.** A classified directory and buyers' guide. Published by the Tradesman Publishing Company, Chattanooga, Tenn. Cloth; 448 pages. Price, \$5.

This volume is issued as the thirty-third annual of the Tradesman. It contains tables of statistical information for the Southern States, a list of manufacturing establishments and hardware and implement dealers, classified both by industries and States, and also gives a list of Southern commercial and industrial organizations with their officers. A particularly valuable feature of the directory is a list of mines and quarries throughout the South. It does not touch upon the iron and steel industry, except as shown by the list of mines and of machine shops and foundries and in the statistical tables.

## Chicago Foundrymen's Club Reunion

The Chicago Foundrymen's Club, with the foundrymen's associations of the neighboring cities as guests, held its annual reunion May 25. The programme for the day included a trip by boat to the Gary mills of the Indiana Steel Company and a banquet in the evening at the Auditorium Hotel. About 300 were in the party visiting the steel mills, where an opportunity was presented for viewing the operation of the Koppers by-product coke ovens, the blast furnaces and the open hearth furnaces. The foundrymen were also given a general view of the entire plant.

At the banquet in the evening the toastmaster was H. O. Lang of Ferguson & Lang, Chicago. Among the invited guests for the occasion were Major J. T. Spear, president American Foundrymen's Association; P. W. Gates, president Hanna Engineering Works, Chicago; three former chief officers of the American Foundrymen's Association, W. A. Jones of the W. A. Jones Foundry & Machine Company, Chicago; Thomas D. West, Sharpville, Pa., and Arthur T. Waterfall, Detroit. Dr. Richard Moldenke, secretary, and H. D. Miles and R. A. Bull, vice-presidents, were in attendance. W. M. Corse, secretary American Brass Founders' Association, and Fred W. Tracey, of the Buffalo Chamber of Commerce, who has been particularly active in arranging for the September meeting at Buffalo, were also among the guests seated at the speaker's table.

## A Large Mesta Casting

The Mesta Machine Company, Pittsburgh, recently poured a very large casting in its foundry at West Homestead, Pa., for a bed plate for a new blooming mill engine, which it is building for the Youngstown Sheet & Tube Company. Five air furnaces were used for melting the iron, in which 260,000 lb. of metal was charged. Each furnace was charged with iron of the same average analysis and the melting of the metal so timed that each furnace would be ready to tap at the right moment. Six ladles were used for carrying the metal from the furnace to the mold, four of which were poured at one time, after which the remaining two were poured. The actual time of pouring, from the time the metal was in the ladles to the time they were emptied, was 17 minutes.

After the casting was poured it was allowed to cool slowly in the sand in the usual way. The casting could not be lifted out of the mold for 16 days, after which time it was taken out and cleaned, and the heads, risers and gates were removed. The net weight of the casting after this operation was 240,000 lb.

## Electrical Control of a Large Mine Hoist\*

BY H. W. CHENEY

The most serious problem encountered in the application of an electric drive to large mine hoists is that of electrical control and it is necessary to furnish a system which is absolutely reliable at all times. All parts of the apparatus must be designed to withstand severe and unreasonable service conditions without giving trouble and without requiring repeated attention and repairs and it should also be impossible for the operator to damage the controller or any part of the machinery by a wrong movement of the operating handle. While this is true of electrical control in general, it applies with particular force to mine hoists since they are generally located remote from supply centers and are operated by men who are as a general thing unfamiliar with electricity. In the electrical control of the large induction motor driven hoists conditions are unusually exacting.

The hoist described in this paper was installed at the No. 3 iron mine of the Woodward Iron Company, at Woodward, Ala. It is of the unbalanced type and consists of a single drum 8 ft. in diameter and 40 in. long with a winding space for 2500 ft. of 1½-in. wire rope. The drum has a band brake which is automatically applied by a weight and released by air pressure under the control of the operator. It is driven by a 500-hp, three-phase, 25-cycle, wound-rotor induction motor, operating at a speed of 375 r.p.m. through a flexible coupling and reduction gear and an air-operated friction clutch. The hoist is designed for a maximum rope speed of 750 ft. per minute and a maximum pull of 25,000 lb. An important feature of the hoist consists of means for automatically applying the brake in case the supply of current to the hoist motor fails. This consists of an alternating-current solenoid energized from the supply circuit through a potential transformer, arranged so that when the solenoid circuit fails the core drops and actuates an air valve on the brake cylinder, thus allowing the brake to be set by gravity in the usual way.

The mine is approximately four miles from the power house of the company and electrical energy is transmitted at a voltage of 3300 and a frequency of 25 cycles over a three-phase system. The hoisting engine and the electrical control equipment are housed in a brick building which is located on the slope of the hill just above the mine entrance. The 3300-volt lines are brought into the hoist house and connected to high-tension busbars. Two switchboard panels are installed consisting of the main motor panel, upon which are mounted an overload, no-voltage release oil switch and an ammeter with a current transformer, and a line panel upon which a non-automatic oil switch and ammeter with a current transformer and three three-pole, single-throw fused knife switches are mounted. Two transformers of 50-kw. capacity, having a ratio of 3300 to 220 and 110 volts, are connected in delta to furnish energy for lighting, for running an electrically-driven air compressor used as an auxiliary and a circulating pump for the liquid rheostat. An electrolytic lightning arrester is also installed.

After the transformers have been excited by closing the non-automatic oil switch, the three-pole single-throw knife switches are closed, thus supplying alternating current at 220 volts to the motor of the water circulating pump, to the air compressor motor through a pressure regulator switch, to the no-voltage coil of the main oil switch on the motor panel and to the terminals of a switch connected to the brake solenoid. This latter switch is mechanically connected to the overload no-voltage release oil switch so that both are opened and closed simultaneously. This switch is now closed and the hoist is ready for regular operation. A forward movement of the operator's control lever closes the primary switch and makes final connection to the primary winding of the induction motor for hoisting, while a reverse movement of the lever closes the primary oil switch making reverse connections with this winding for lowering. This arrangement was necessary since the slope of the mine near the engine was not suffi-

cient for the empty cars to unwind the drum of the hoist by gravity.

The secondary windings of the motor are connected to the terminals of the liquid rheostat for varying the resistance of the secondary circuit and controlling the speed of the motor. The operation of this rheostat is controlled by the same lever that is used to open and close the primary switch. The limit switch is a special feature and is placed on the trolley in such a position that if the cars overrun it will be mechanically opened by a track lever. The circuit of the no-voltage release coil of the main oil switch passes through this limit switch and in case the car passes the limit of travel the oil switch and the solenoid switch are automatically opened. A push button which is normally open is provided on the motor panel for closing the circuit of the no-voltage release coil after the cars have overrun in order to back them into position again for regular operation. This arrangement was purposely made so that an extra man will have to be called upon to help. Another safety feature worthy of notice is the provision for the automatic opening of the overload no-voltage oil switch in case the non-automatic transformer switch is open, thus cutting off the supply current to the auxiliary apparatus and making it impossible to hold the overload switch closed.

The controller consists of a primary switch for opening, closing and reversing the 3300-volt primary connections to the motor and the resistance in the secondary circuit limits the line current for the required torque for starting and for speed regulation during regular operation. The primary switch is immersed in oil and is so arranged that when turned in a clockwise direction, connections are made for forward rotation, while if turned in the opposite direction the motor is reversed. The liquid rheostat consists of a concrete tank in which stationary cast-iron plates are suspended as electrodes, the electrolyte being mechanically raised to vary the resistance. The electrodes, which are ribbed to give maximum contact area with a minimum amount of space, are made of a special form to give a smooth speed and accelerating curve and are mounted on insulating supports set in a recess in the concrete tank near the top. Four electrodes are used for the three-phase circuit, the two outer ones being connected together and to one phase. By proper spacing the correct amount of resistance in a balanced three-phase star-connected resistance is obtained at all times. The electrolyte used consists of ordinary well water, which has a small quantity of salt dissolved in it, 9 lb. per 1000 gallons giving the best results. Movable weirs in the form of pipes which are raised or lowered through an opening near the bottom of the tank regulate the height of the liquid and consequently the amount of resistance in the secondary circuit of the motor. The arrangement of the weirs is such that all of the liquid cannot escape when they are in their lowest position and as the lower ends of the electrodes are always thus immersed the secondary circuit is never opened. The maximum amount of liquid in the tank can escape in 20 seconds, and with the gate valve wide open and with the weirs raised to the highest point the tank will fill in approximately twice that time. Air operation is employed throughout for the control mechanism.

The Amalgamated Association of Iron, Steel and Tin Workers, in session at Chicago for more than two weeks, adjourned May 23 after completing a revised wage scale to be submitted to those manufacturers who recognize the association. The officers were re-elected as follows: John Williams, president; M. F. Tighe, secretary and treasurer; Ben I. Davis, editor of the *Amalgamated Journal*, the official organ. Arrangements have been made for a conference early in June between representatives of the Amalgamated Association and the Western Bar Iron Association.

The Alloy Steel Casting Company, Wheeling, W. Va., recently received an order through its New York representative, R. B. Steele, 256 Church street, for 40,000 lb. of vanadium iron castings, particularly bull head and follow rings, and piston ring parts for the Interborough Rapid Transit Company. The metal for these castings is melted in the Carr detachable open hearth furnace described in *The Iron Age* of March 21, 1912, which is used also for the production of vanadium and other alloy steels.

\*From a paper read before the American Institute of Electrical Engineers, at Pittsburgh, Pa., April 25-27.



## New Tools and Appliances

*This is essentially a news department for which information is invited*

**Universal Electric Drills.**—Two new sizes of universal drills capable of operating on either direct or alternating current circuits have been placed on the market by the Cincinnati Electrical Tool Company, 650 Evans street, Cincinnati, Ohio. The construction is said to be radically different from anything now on the market and the drills are substantially built. The armature runs in ball bearings and the gears are inclosed and run in grease, an arrangement which lubricates them continuously and at the same time protects the electrical parts from dust and grease. Aluminum is used for the outside body of the drills. The outside diameter is 4 in., and a spade and a straight handle about 5 in. long are furnished with the tools so that it is possible for the operator to get a good grip on them. The capacities of these drills are 3/16 and 1/4 in. in steel and hard wood, and 3/8 and 1/2 in. in soft wood respectively. The net weights of the two tools are 7 1/2 and 8 1/2 lb.

**Grinder Countershaft.**—The Rivett Lathe & Mfg. Company, Brighton, Mass., is equipping its grinding machines with a new type of countershaft which is a complete unit intended for fastening the wall. This countershaft consists of four shafts arranged in two groups of two each. The driving belt runs around the tight and loose pulleys at the right of the first shaft and this shaft in turn drives the grinding wheel spindle through a second shaft. A speed range is secured by the use of three-step cone pulleys. A belt from a second cone pulley on the first shaft drives a third shaft from which the mechanism controlling the table travel is driven and a belt connection from this shaft drives the drum on which the belt driving the work spindle runs. All of these mechanisms have three speed changes, cone pulleys having that number of steps being used. A clutch operated by a conveniently located handle controls the driving of the drum so that the work can be stopped at will.

**Valve Grinder.**—A valve grinder driven by a gas or gasoline engine has been placed on the market by the McConnell-Browning Engineering Company, Richmond, Va. In construction this grinder is said to be very simple. A worm and sleeve provide the reversing motion necessary to grind the valve while a reciprocating movement is imparted to the sleeve by turning the crank to which it is fastened by a connecting rod. The position of the valve on its seat during the grinding process can be shifted without removing the tool from the work.

**Automatic Box Nailer.**—The Automatic Machine Company, San Francisco, Cal., has brought out an automatic box nailer which when fed with box shooks will turn out complete boxes measuring 12 by 18 by 18 in. at the rate of about 500 per hour. In operation the ends are fed into each side of the machine while the bottoms with the two side pieces are piled one above the other and are forced out to the nailing table by the feeding mechanism. The sliding crosshead which feeds the bottoms and the sides receives motion from the main drive and runs continuously when the machine is in operation. It is fitted with dogs which snap out at the proper time to pick up the shooks lying next to it. After the sides have been nailed fast to the ends by the nailing head through the action of its plungers, the box is turned through an angle of 90 deg. to receive the bottom, which is nailed fast in the same way. Automatic compensation is provided for the difference between the height and the width of the box and also for the varying thicknesses of wood used and perfectly rectangular boxes are said to be produced regardless of inaccuracies in the lumber.

**Anchor Screw.**—To obtain a metal-lined screw hole which will increase the holding power of the screw in concrete stone, masonry, tile, etc., the Richmond Screw Anchor Company, 9 Church street, New York City, has placed on the market a new type of anchor screw. It consists of two parts, the screw proper and a helical bushing in which the screw is inserted. In old masonry a hole large enough to admit the anchor is drilled and filled with cement or plaster of paris. The bolt with the anchor screwed on as far as it will go is then cemented into

the hole, care being taken that the hole is at least 1/4 in. deeper than the length of the bolt which is to be inserted. When the cement is hardened the bolt is removed and the fixture to be attached to the masonry fastened by replacing the bolt. In the case of new work the anchor and screw are placed in position and the concrete allowed to set around them. Holes are also made in the forms of the same size as the neck of the bolt and the forms are set up by taking out the bolts with a wrench, placing the forms in position and then screwing the bolts into the holes again. The bolts range in diameter from 1/4 to 1 in. and in length from 1 1/2 to 12 in. and are recommended for structures subject to vibration.

**Belt Hangers.**—A safety belt hanger intended to prevent belts from winding up on the shaft when they are thrown off or on the pulleys and thus cause accidents is being made by the Universal Stamping Company, 47 Poultny street, Buffalo, N. Y. This hanger consists of a cast-iron bracket attached to the ceiling or shafting hanger support. A piece of steel tubing bent at right angles on the lower end forms the hanger proper and carries a roller which is held in place by a small casting driven in the end of the tube. The hanger is located over the center of the shaft on the side of the pulley where the belt is usually thrown off. The rim of the pulley should be about 1/2 in. above the supporting roller, which should have its end close to the side of the pulley. When a belt is thrown off the pulley it runs on the roller and in replacing it little effort is required since the belt is held close to the pulley rim by the hanger.

**Motor-Driven Lathe.**—The Champion Tool Works Company, Cincinnati, Ohio, has recently devised a new way of applying motor drive to its lathes. The motor is mounted on top of the headstock and the power is transmitted through steel, rawhide and friction gears to the spindle sleeve and from there to the spindle through a face gear or through double back gears. The spindle speeds vary approximately from 400 to 1200 r.p.m. and the speed of the motor is regulated by a drum type controller located under the headstock. This controller is operated by a crank handle at the right of the apron, the connection between it and the controller being made through bevel gears, a splined rod and chain and sprocket wheels. A hand wheel on the outer end of the motor shaft permits the operator to revolve the lathe spindle by hand if necessary for chucking or inspecting the work.

**Combination Tachometer and Watch.**—Schuchardt & Schütte, West Street Building, New York City, have recently placed on the market a device known as the Tachoscope, which consists of a revolution counter and a stop watch connected so that they will operate simultaneously when a slight pressure is applied to the center spindle. The revolution counter and the watch stop instantly when the pressure is removed, thus indicating on the dials the number of revolutions made in a definite period. The watch records up to 30 min. and then repeats and the duration of the tests is indicated in minutes, seconds and fractions. The revolution counter has three pointers which indicate from 1 to 100 and 100 to 1000 and 1000 to 10,000 r.p.m. respectively. The instrument can be used for either right or left-hand rotation without any adjustment and the appearance of either a red or a black disk on the counter dial indicates whether the rotation is either right or left, and shows the proper figures to use, as there are two sets colored to correspond with the disks.

**Motor Starter.**—The Detroit Fuse & Mfg. Company, Detroit, Mich., has developed a new type of three-phase motor starter in which it is not necessary to fuse the motor for the starting current since it is automatically protected from injury by the starter. The device is of substantial construction, all the mechanical or moving parts being inclosed in a cast-iron box. The switch is operated by a hand lever on the side. In starting the motor the lever is moved to the starting position and held there until the motor reaches its normal speed. The action of moving the lever to the starting position closes the circuit and places the fuses therein but parallels them with a solid copper bar to take care of the starting load. When the operator removes his hand from the lever the parallel bars are thrown out of circuit without opening it, and the fuses are thus left in position to protect the motor.

# The Machinery Markets

From nearly all sections of the country a fair amount of business is reported by the machinery trade, with attractive prospects in some cities. The dearth of any big movement in buying continues, the great bulk of orders being small. New York conditions remain unchanged with many inquiries and a fair number of sales. While the demand is confined to the smaller tools in Philadelphia, a betterment in business is reported, with railroads making some inquiries. As a whole, New England conditions are excellent and although one or two lines are somewhat dull, others are satisfactory and machine tool accessories are in especially good call. In Cleveland inquiries for small lots have improved and handling equipment is active. More activity in both domestic and export requirements exists in Cincinnati, which also is feeling a good demand for boilers. Chicago is estimating on a list of about 30 machine tools for the Atchison, Topeka & Santa Fe Railroad and industrial companies have come into the market in a pleasing way though not with notably large orders. Inquiries are encouraging in Detroit, although business there appears to have slackened a little. In the Central South business is quiet but an improvement is looked for in June. Birmingham notes an increase in deliveries of boilers and engines which were held up by the recent floods in the South and also reports greater activity in the saw mills. St. Louis conditions are quiet. In Texas the demand for pumping plants for irrigation continues the feature and all conditions point to a continuance of satisfactory business.

## New York

NEW YORK, May 29, 1912.

Little has developed since the last report to change the character or volume of trade in the New York machinery market and the month will close with a fair total of sales. Inquiries are said generally to be good in number, but none is notable for size. With one or two exceptions the buying has been for replacements rather than for any extension of facilities. The most important exception in this respect was recent buying by a large pump company. Hoisting machinery houses are figuring on needs created by the large tunneling and subway operations in this city. Some good sales have been made of forging machines, one or two railroads having been among these buyers. Among the factors in the New York market in the last few days was the Lycoming Foundry & Machine Company, Williamsport, Pa., which bought a fair list of machine tools and also placed some orders in Philadelphia. Another buyer was the International Type Setting Machine Company, which purchased some small machine tools. This company is now operating three shops for preliminary work which are to be merged into one large one probably early next fall. Orders have not been placed as yet against the list of the Safety Heating & Car Lighting Company, Jersey City, N. J., although it is understood the orders are impending. The U. S. Metal Products Company, College Point, L. I., is reported to be in the market for a drill press, hack saw and cylindrical grinder for tool room purposes.

The Oxweld Acetylene Company, which was recently granted a permit for the erection of a factory at 646 Frelinghuysen avenue, Newark, N. J., where it is to manufacture acetylene welding appliances, has added to its land holdings by purchasing 450 ft. of ground adjoining its site. Arrangements are being made for the Pennsylvania Railroad to place a siding on the company's property. The purpose of the latest purchase by the company is understood to be to protect its property from future developments.

C. F. Splitdorf, Inc., manufacturer of magnetos, spark plugs and other electrical appliances, has been absorbed by the Splitdorf Electrical Company, a new company incorporated under the laws of the State of New Jersey with a capital stock of \$3,500,000. John F. Alvord, of the Torrington Company, Torrington, Conn., is president of the new company and C. F. Splitdorf is vice-president. The business which C. F. Splitdorf has carried on at his factory in New York City will be extended, but no radical changes will be made for the present.

The Frevert Machinery Company, 38 Vesey street, New York City, the business of which has been conducted since its establishment in 1906 by H. F. Frevert, has enlarged its operations and filed papers for incorporation under the laws of the state of New York.

Valentine & Co., 364 Manhattan avenue, Brooklyn, N. Y., manufacturers of varnishes and paints, have awarded to the Turner Construction Company, 11 Broadway, New York, the contract for the erection of an addition to their plant. The building will be 33 x 64 ft., two stories, of reinforced concrete construction.

The Hartford Suspension Company, Jersey City,

N. J., manufacturer of shock absorbers for automobiles, has had plans prepared by Howard Chapman, architect, for a building 75 x 127 ft. and six stories, of reinforced concrete construction. This will be the second building erected by this company within two years. Details as to the equipment are not yet announced. The Turner Construction Company, 11 Broadway, New York, has been awarded the contract for the erection of the building.

Hubbard, Eldredge & Miller, Rochester, N. Y., have had plans prepared for an addition 30 x 124 ft., two stories, of brick construction. The addition is mostly for warehouse purposes and but little additional machinery will be required.

The Thomas Hide & Leather Company, Middleville, N. Y., is having plans prepared for an addition to its plant, the estimated cost of which is \$100,000. Walter J. Frank, Clarendon Building, Utica, N. Y., is the architect.

The Development & Funding Company, Niagara Falls, N. Y., is letting contracts for an extensive addition to its plant at Buffalo avenue and Union street.

The United States Light & Heating Company, Niagara Falls, N. Y., has awarded a contract to the Leonard Construction Company, Chicago, for the erection of an addition to its plant to give room for the manufacture of automobile starting devices. The building is to be 56 x 320 ft. and three stories, of reinforced concrete construction.

The H. M. Hirschberg Company, Owego, N. Y., has been incorporated with \$25,000 capital stock by W. Huck, Jr., A. W. Dalton and J. Gerralt, New York City, to manufacture lighting fixtures.

The Horse Shoe Oil Company, Salamanca, N. Y., has been incorporated with a capital stock of \$30,000 to produce and refine petroleum. H. Knight, W. R. Seil and D. J. Maley, Jr., are the incorporators.

The State Hospital Commission, T. E. McGarr, secretary, Albany, is receiving bids for refrigerating and ice-making apparatus in connection with the cold-storage building to be erected by the Utica State Hospital at Utica, N. Y. The same commission is receiving bids for a steam header main for eight boilers to be installed at the Rochester State Hospital, Rochester, N. Y.

The Oneida Foundry Company, Oneida, N. Y., which is completing a new plant for the manufacture of gray iron castings, will install two cupolas, 66 and 56 in. in diameter, respectively; one hydraulic elevator for delivering material to the charging floor; one gravity machine; two jar rammers and one squeezer for molding; two tumbling barrels and one cinder mill. Also equipment for a small machine shop.

The Barrows-Stewart Company, Townsend Building, New York City, has been awarded the contract for the pulp and paper manufacturing plant to be built at Mechanicsville, N. Y., by the West Virginia Pulp & Paper Company. The work will include a sedimentation basin, 110 x 325 ft.; a clear water reservoir, 85 x 325; a filter house, 83 x 113 ft.; a storage and mixing house, 28 x 54 ft., and 1800 ft. of pipe line.

The Binghamton Railway Company, Binghamton, N. Y., J. P. E. Clark, general manager, is completing plans for extensive additions to its power plant, including the installation of an electric generating unit of 15,000 kw. capacity.

The Elite Furniture Company, Jamestown, N. Y.,



has completed plans for a new factory, 54 x 100 ft., four stories and basement, which it will build at once on a site recently acquired on Allen street, in the East Jamestown factory district.

The Leader Iron Works Company, Decatur, Ill., W. A. Shorb, president, will erect a storage warehouse at Oswego, N. Y.

The New York Central Railroad Company has plans under way for making Utica the chief division terminal point between New York and Buffalo.

About 1000 acres of land have been purchased in the eastern outskirts of Utica,  $\frac{1}{2}$  x 4 miles, extending from North Genesee street to the town of Harbor. Transfer and storage yards will be laid out with round-houses, repair and machine shop, freight houses, etc. It is stated that an outlay of \$5,000,000 has been provided for the purpose. The plans also include the erection of a large passenger station at Utica.

The Western Block Company, Lockport, N. Y., is adding a machine shop 60 x 80 ft. and two stories of brick and steel construction to its plant.

The Niagara Paper Company, East Lockport, N. Y., is building an addition 70 x 70 ft. and three stories to its plant, increasing its floor space by 15,000 sq. ft.

The Chalmers Knitting Company, Amsterdam, N. Y., will build a new plant on a site 300 x 360 ft. which it has purchased.

The Cornell University, Ithaca, N. Y., is receiving bids for a central heating plant for the New York State College of Agriculture.

The Wilson Cotton Mills, Wilson, N. Y., is completing plans for an addition to be made to its factory at a cost of about \$25,000. New machinery will be installed.

The Frontier Iron Works, Buffalo, N. Y., is building a one-story addition to its plant at Letchworth street and the New York Central Railroad.

The Willford Company, Buffalo, has been incorporated with a capital stock of \$25,000 by Wm. H. Linford, Jno. C. Haskell and others and will establish a factory and laboratory for the manufacture of perfumes and toilet preparations.

The Crosby Company, 161-183 Pratt street, Buffalo, manufacturers of sheet metal stamped goods, is having plans drawn for a four-story addition of steel and concrete. The new building with equipment will cost approximately \$150,000.

## New England

BOSTON, MASS., May 28, 1912.

Considering the situation as a whole, conditions are excellent. This is in spite of the fact that certain lines are less active than a month ago, notably in the machine tool trade, lathes and planers. Equipment accessory to machine tools is in increasing demand, according to reports of representative manufacturers. Answers to inquiries sent to a large number of New England manufacturers of equipment used in the metal industry show a large percentage of houses which are well satisfied with the present situation and with the outlook, their opinions being based upon their individual experiences.

F. E. Reed, founder and for many years head of the F. E. Reed Company, Worcester, Mass., has resigned the office of director of the Reed-Prentice Company of that city, which is the amalgamation of the business of the F. E. Reed Company and the Prentice Bros. Company, manufacturing lathes, radial and upright drilling machines. Mr. Reed's action is due to his poor health. He had been made one of the executive committee of the company's board of directors. C. A. Nourse, general superintendent of the American-La France Fire Engine Company, Elmira, N. Y., has accepted the office of superintendent of the Reed-Prentice Company.

The Arcade Malleable Iron Works, Worcester, Mass., has begun the erection of an addition to its plant, which will largely increase its manufacturing capacity.

The Lead Lined Iron Pipe Company, Wakefield, Mass., will erect an addition 50 x 50 ft.

The Beaton & Corbin Mfg. Company, Southington, Conn., is to rebuild a large part of its original factory, the new structure to be of brick, two stories and basement. The company manufactures ceiling and floor plates and other steamfitters' supplies, and contemplates enlarging its line. With the completion of the building the company will be much better equipped to take care of its rapidly growing business.

The Potter & Johnston Machine Company, Pawtucket, R. I., is making extensions to its works. The company reports business as extremely good and the outlook for the future very encouraging.

The Whitlock Coil Pipe Company, Hartford, Conn., has begun the manufacture of a new style of steel filing cabinet for the Unit Steel Cabinet Company, New York. The cabinets are built on the unit idea, with a connecting rod so that cabinets of all sizes may be tied together.

The Carlyle Johnson Machine Company, Manchester, Conn., has brought out a new reversing gear for use in motor boats. The basis of the device is a double Johnson friction clutch. In the company's former type one double friction and one single friction clutch were used, and the gearing was arranged to accomplish the reverse outside of the clutches. In the new design the single clutch is done away with and the gearing is placed inside of the double clutch.

The National Equipment Company, Springfield, Mass., manufacturer of confectioners' machinery, has awarded the contract for a three-story brick building, 80 x 360 ft., with a wing 80 x 100 ft.

The Turner & Seymour Mfg. Company, Torrington, Conn., will erect an addition, 42 x 64 ft., two stories and basement.

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., is preparing plans for a machine shop building, 60 x 180 ft., one story, with a gallery on two sides. It will have a saw-tooth roof and steel trusses.

The J. N. Lapoint Company, Marlboro, Mass., manufacturer of broaching machinery, will erect a plant at New London, Conn. The main building will be 48 x 132 ft., two stories, with an extension 42 x 50 ft. The building will be of brick and steel. Electric power will be used.

The Maine Central Railroad Company, which is controlled by the New York, New Haven & Hartford, has increased its capital stock from \$10,000,000 to \$15,000,000. A part of this new money will go toward the reduction of funded indebtedness and the remainder for improvements to the properties.

The Boston & Albany Railroad Company will issue \$1,000,000 in bonds, the proceeds to be devoted to improvements.

The Grand Trunk Railroad will undoubtedly secure the necessary legislation authorizing it to construct various lines of steam railroad in Massachusetts. Its plans include the amplification of the line, the construction of which has already begun, from Palmer, Mass., to Providence, R. I. A spur track will connect Worcester with the system and a main line will be built to Boston. Another main line will run northwest from Boston, crossing the New Hampshire boundary just south of Nashua. A feature of the system will be a belt line around Boston. The northern line will strike the water front at Chelsea, the southern line at South Boston, and the belt will connect the terminals. Business houses are welcoming a railroad which is independent of the New Haven and the New York Central systems, for competition has been practically eliminated.

James C. Doran & Sons, Providence, R. I., manufacturers of jewelry, have awarded a general contract to the Turner Construction Company, 11 Broadway, New York, for the erection of a nine-story L-shaped building, of reinforced concrete construction, containing about 13,000 sq. ft. of floor space.

## Philadelphia

PHILADELPHIA, PA., May 28, 1912.

Machine-tool merchants, as well as builders, report a somewhat better volume of buying, but confined almost entirely to single tools. Less hesitancy is being shown in the placing of orders, as it is found that a number of industrial plants and manufactories are a little better engaged and have reached the stage where contemplated purchases of tools are hurriedly closed. There has also been some betterment in the demand for special metal working machinery, and makers of certain classes of equipment are more active. Builders of the heavier type of tools designed for railroad shop work have not found the improvement as strong as in other directions. The trade has experienced a resumption of scattered inquiries from the railroads in this district. Several tools have been asked for by both the Philadelphia & Reading and the Pennsylvania railroads, but orders against these inquiries develop very slowly. The local locomotive builder continues to receive a fair volume of business and is gradually extending its operating force. Moderate orders for medium capacity engines are being placed with builders, and boiler makers are experiencing a fair demand. Shipyards are actively engaged and are bidding on

further inquiries. Eastern yards are busier than they have been for a long time.

A very fair business in second-hand machinery and tools is reported; sales of boilers have also been a shade better. The export trade continues to drag. Foundries are better engaged; the productive rate is higher and more inquiries for sizable orders are reported. Steel casting plants have more work ahead than for some time, while makers of gray iron and machinery castings are also booking more orders.

Kind & Lansman, gelatine manufacturers, Fifth and Erie streets, Camden, N. J., whose plant was partially destroyed by fire several months ago, have given a contract to the Turner Concrete Steel Company, Philadelphia, Pa., for the construction of two buildings, 106 x 111 ft., two stories, of reinforced concrete, which will be equipped with machinery for the manufacture of gelatine. The old boiler plant was not destroyed, but new engines will be installed. The major portion of the equipment is of a special nature.

Herman Loeb, Director of Supplies, room 312 City Hall, Philadelphia, Pa., will receive bids until June 3 for boiler tubes for use in the Water Department.

The Bell Telephone Company is understood to have had plans prepared for a 17-story concrete and steel office building by J. T. Windrim, architect, to be erected at Seventeenth and Arch streets. Details are not available, although bids, it is said, will be taken in a short time.

Announcement is made of the change in the partnership existing under the name of Berry & Aikens, dealers in second-hand machinery and old materials, at Thirty-second and Wharton streets. Edward V. Berry and James Stewart, Jr., will continue the business under the name of Berry & Stewart.

Ballenger & Perrot, engineers, have awarded the contract for the erection of a power house and laundry for the Academy of the Sisters of the Immaculate Heart of Mary, West Chester, Pa., to Edward Atkins. The matter of the machinery equipment for the building will not be considered until midsummer.

The Baldwin Locomotive Works is making rapid progress with the construction of the various additions to its plant at Eddystone, Pa. The new erecting shop, one of the largest of its kind, is rapidly approaching completion, and other important improvements are under way. The Baldwin Works has received a number of additional orders recently and is steadily increasing its operating force.

The reported establishment of a repair plant and machine shop at Chester, Pa., by the Pennsylvania Railroad has been denied by officials of that company. It is now stated that Harry Kidd, formerly identified with foundry interests in that city, will operate a small foundry and machine shop at Fifth and Ward streets, which was the location of the plant credited to the Pennsylvania Railroad Company. No details regarding the proposed undertaking are available.

The Pennsylvania Flexible Metallic Tubing Company has purchased seven acres of land at Seventy-third street and Suffolk avenue, adjacent to its present plant, which is to be so enlarged as to increase the capacity more than 50 per cent. Plans for the buildings are now being prepared. Considerable additional machinery and power equipment will be required, purchases of which are now being considered.

The John T. Lewis & Bros. Company has awarded a contract to the Turner-Forman Concrete Steel Company for the erection of a one-story manufacturing building 185 x 265 ft., with a three-story wing 60 x 120 ft., at Huntingdon street and Aramingo avenue. The company is still considering the purchase of necessary equipment for the melting and casting of pig lead.

The United States Light & Heating Company, Niagara Falls, will manufacture under license from the Standard Gas & Electric Power Company, of this city, the automobile self-starting device developed by that company. It has leased the plant formerly occupied by the Standard Gas & Electric Power Company at Thirty-eighth street and Lancaster avenue.

The Scofield Engineering Company is reported to be preparing revised plans for a one-story power house 87 x 100 feet to be erected for the Municipal Electric Company, Danville, Va.

Plans are under way for the incorporation of the Chester Products Company, Chester, Pa., which will engage in the manufacture of chemicals in a plant which is to be occupied by it at Penn and Patterson streets. E. M. Harris, Jr., E. B. Dorsett and Thomas G. Hunter are reported as being identified with the company.

## Chicago

CHICAGO, ILL., May 28, 1912.

The machinery trade in this territory is enjoying a display of active buying interests on the part of a large number of manufacturers who are either building additions to their plant or installing new equipment. There is also a noteworthy inquiry for second hand machinery. Among the miscellaneous sales of the past week are four 20-in. lathes, a 42-in. boring mill, a 48-in. open side planer, a number of drills and several punches and shears. A nearby steel foundry which is installing a department for the manufacture of mill machinery bought three roll lathes, 50, 42 and 30 in., respectively from the United Engineering & Foundry Company; also a Landis Tool Company roll grinder, one 40-ton and two 10-ton Whiting cranes.

### The Atchison, Topeka & Santa Fe List.

The most important large inquiry is that of the Atchison Railroad, which includes in two sections the following tools:

One 800-lb. hammer.  
One 36-in. x 18-ft. lathe.  
One 36 x 36-in. x 12-ft. planer.  
One 250-ton hydraulic crank-pin press.  
One grindstone.  
One wet tool grinder.  
One punch and shear.  
One 2-in. double-head bolt cutter.  
One 24-in. shaper.  
One 20-in. x 10-ft. lathe.  
One 30-in. knife grinder.  
One motor driven emery wheel.  
One 55-in. x 11-ft. center engine lathe.  
One 2 x 24-in. flat turret lathe.  
One 37-in. boring mill.  
One 1½-in. double-head bolt cutter.  
One 1500-lb. single frame hammer.  
One double spindle woodworking lathe.  
One 51-in. boring mill.  
One heavy drill; one 6-ft. radial drill.  
One 2-in. bolt header.  
One 20-in. x 8-ft. engine lathe.  
One 24-in. x 16-ft. engine lathe.  
One 36-in. x 18-ft. engine lathe.  
One 28-in. x 12-ft. engine lathe.  
One 20-in. cabinet turret lathe.  
One No. 2 universal grinder.  
One 84-in. boring mill.  
One horizontal boring mill, and one 28-in. upright drill.

The Roberts Portable Oven Company, Chicago, is in the market for a drill press and small angle shear.

The Continental Engine Company, Chicago, has increased its capital stock from \$10,000 to \$50,000 and has chosen a location at Dallas City, Ill., upon which a new factory will be built.

The Garden City Spring Works, Chicago, has recently acquired property at the junction of Archer avenue and Twenty-third street, upon which a modern completely equipped shop will be built.

The Illinois Architectural Iron Works has purchased a site in South Chicago, 149 x 150 ft., which it is holding for the erection of a new plant.

George J. Koehl of Chicago, it is reported, will move his machine shop to Greenfield, Ind., where he will occupy a building 100 x 100 ft.

The Western Wheeled Scraper Works, Aurora, Ill., is preparing plans for improvements to its plant involving an outlay of \$250,000 and including the installation of new boilers and turbine power plant.

The Weis Paper Mill Company, Quincy, Ill., has been incorporated with \$25,000 capital for the equipment of a plant for the manufacture of strawboard, etc. The incorporators are Henry Weis, A. W. D. Weis and George D. Slickty.

The Modern Machine Company, Belleville, Ill., has changed its name to the Modern Die & Plate Press Company and will very largely increase its plant for the manufacture of die presses, hand stamping and copper plate presses. It will also open a showroom in New York City at 116 Nassau street.

The Empire Mfg. Company, Rockford, Ill., has broken ground for an addition to its plant of considerable size.

The Wisconsin Aluminum Foundry Company, Manitowoc, Wis., has been organized with a capital stock of \$3,500 by Henry Stahl, Bruno Dallwig and Abraham Schwartz.

The city of Appleton, Wis., has under consideration the issuing of bonds to the amount of \$200,000 for the improvement of waterworks system.

Guiterman Brothers, St. Paul, Minn., have completed plans for the construction of a two-story factory building in that city at an estimated cost of \$9,600.

The Chicago, Milwaukee & St. Paul Railroad is preparing plans for the extension of its car repair shops at Minneapolis, Minn., at a cost estimated from \$150,000 to \$200,000.



Morningside College, Sioux City, Ia., contemplates among other improvements the expenditure of \$20,000 on a new heating plant.

The Shorthill Steel & Iron Works is about to begin the construction of a plant at Perry, Iowa. C. R. Spears is the manager.

At Red Lake Falls, N. D., a bond issue of \$25,000 has been authorized for the building of a waterworks.

## Cleveland

CLEVELAND, OHIO, May 28, 1912.

Inquiries for machine tools improved somewhat in the week, several coming out for four or five tools. Orders placed have been light, being mostly for single tools. Lathes have been in better demand than other standard tools. The automobile trade has been buying more freely lately, orders from this source being largely for special tools. The demand for handling equipment of various kinds has become quite active and a number of live inquiries are pending. There is a good call for equipment for garbage disposal plants and for dryers for various purposes. Plants making molding machines and other foundry equipment are getting a good volume of orders. The demand for portable electric drills and reamers is very satisfactory. Second hand machinery is moving quite freely.

In the foundry jobbing trade the general demand is quite satisfactory, but there is considerable complaint of a scarcity of molders, and on this account some local plants are being operated at less capacity than they otherwise would.

The Plain Dealer Publishing Company, Cleveland, will enlarge its power plant and will install a new engine, a 180-hp. Sterling boiler and a Detroit Stoker Company stoker.

The Foote-Burt Company, Cleveland, maker of drilling machinery, reports a very satisfactory improvement in orders. The company now has enough work on hand to keep its plant in full operation for four months.

The Osborn Mfg. Company, Cleveland, manufacturer of molding machinery, foundry supplies, brushes, etc., will shortly begin the erection of a three-story brick addition to its plant 75 x 100 ft. The extension will be used for general manufacturing purposes. Some new machinery equipment will be required.

City Engineer Ballard of the municipal lighting plant, Cleveland, has been authorized to prepare plans and specifications for electric equipment to be installed in the Division pumping station at approximately a cost of \$35,000.

A new foundry company to be known as the Mansfield Foundry & Machine Company, is being organized in Mansfield, Ohio. It will be incorporated with a capital stock of \$10,000. The company will occupy a plant at Eclipse street and First avenue and will make gray iron castings. Among those interested are Oscar Jacobs, Arthur Jacobs and Harry Krum.

The Miller Rubber Company, Akron, Ohio, expects shortly to have plans prepared for a large plant for the manufacture of various rubber products.

The Mechanical Rubber Company, Cleveland, Ohio, has awarded contracts for the erection of a four-story addition to its plant. The building will be of mill construction 100 x 150 ft.

The Arnold Creamery Company, Cleveland, Ohio, will erect a new creamery building, about 50 x 92 ft., of brick, steel and reinforced concrete.

The contract for a new factory and office building to be erected by the Akron Rubber Mold & Machine Company, Akron, Ohio, has been awarded to Walter I. Thompson & Son of Cleveland. The building will be one and two stories and about 30 x 60 feet, of brick, steel and reinforced concrete.

The Ohio Seamless Tube Company, Shelby, Ohio, is planning a number of plant extensions and improvements. Contracts have been placed for two new high pressure boilers, new engine, two new traveling cranes and other machinery. An addition will be built to the plant.

The Pfahl Gauge & Mfg. Company, Akron, Ohio, has been incorporated with a capital stock of \$30,000 by Fred L. Pfahl, C. L. Stobel, E. E. Otis, L. L. Barnes and E. P. Otis.

The Cleveland Worm & Gear Company, Cleveland, Ohio, has been incorporated with a capital stock of \$100,000 by Frank E. Gregg, A. T. Mills and others.

The Edgemont Machine Company, Dayton, Ohio, has had plans prepared for a new two-story factory building.

The Toledo Sugar Company, Toledo, Ohio, has let a contract for the erection of a large beet sugar plant at Rossford, near Toledo.

The City Council of Zanesville, Ohio, has author-

ized Service Director Evans to employ an engineer to prepare plans and estimates for a filtration plant and new plumbing equipment. A bond issue of \$150,000 is proposed.

A contract for the erection of an addition to the plant of the Bardons & Oliver Company, Cleveland, Ohio, maker of turret lathes, has been awarded to John Gill & Sons, Cleveland. The addition will be a five story structure of brick and steel and reinforced concrete construction.

A new shoe factory will be built at Delaware, Ohio, by the C. & E. Shoe Company. The building will be a two-story frame structure 48 x 208 ft.

The Eavey Packing Company, Xenia, Ohio, will erect a new packing plant. The structure will be of pressed brick, 60 x 144 ft., and will range from one to three stories.

The Buckeye Twist Drill Company, Alliance, Ohio, has nearly completed its new plant and expects to begin to install machinery about June 1. It is the intention to have the plant in operation by June 15.

## Detroit

DETROIT, MICH., May 28, 1912.

Conditions in the local machine tool market have changed very little in the last week; if anything, business may have been said to have slackened somewhat. Little business of importance has been closed. Inquiries are reported to be encouraging, however, and some fair business is in sight, not only from local sources but from the upstate manufacturing centers. The automobile accessory industry seems to be the center of interest among machinery dealers at present, and the new plant to be established by the Parrish Mfg. Company is expected to be productive of some business. General manufacturing conditions are satisfactory in most lines and automobile companies especially are adding to their quota of employees. The second-hand machinery market is showing considerable activity, with a better demand for metal working tools reported.

The Century Electric Motor Car Company, Detroit, recently incorporated, has completed plans for its new plant which will be erected at Woodward and Lothrop avenues. The new building will be 105 x 200 ft., of brick and steel construction. John Gillespie is general manager of the company.

The Parrish Mfg. Company, Detroit, maker of automobile frames, has purchased the plant of the Seamless Steel Bathtub Company, at Mt. Elliott and Harper avenues, and will equip it with modern machinery. It is reported that several new buildings will be added to the plant.

The Rock Surfacing Company, Detroit, has been incorporated with \$10,000 capital stock to manufacture a patented flooring and roofing material. The incorporators include H. A. Fitzgerald, P. A. Geller, James and W. N. Whittemore. The company has secured a factory at 52 Baltimore avenue, East.

Plans are being prepared by Albert Kahn, architect, for a new plant for the Peninsular Printing & Engraving Company, Detroit, to cost \$100,000. The new structure will be located at Woodward avenue and Erskine street and will be 100 x 204 ft., two stories.

R. C. and L. G. Hupp have purchased eight acres of land adjacent to the plant of the R-C-H Corporation, Detroit, manufacturer of automobiles, and, it is reported, will build a large addition to the R-C-H plant.

The Delphie Specialty Mfg. Company, Detroit, has been incorporated with \$20,000 capital stock to manufacture automobile parts and accessories and to do general machine work. Peter J. Wesolowski is the principal stockholder.

The Jolls Motor Truck Company, Detroit, has been incorporated with \$20,000 capital stock to manufacture automobile trucks. The incorporators are Leroy E. Jolls, George Hornberger and Sidney J. Harry.

Malcomson & Higginbotham, Detroit, architects, are preparing plans for a new factory building to be erected by the Michigan Pattern Works.

The Henderson Motorcycle Company, Detroit, has commenced the construction of its new factory which will be located on Cass avenue. The building will be 65 x 165 ft., two stories. T. W. Henderson is president of the company.

It is reported that Pratt, Carter, Sigsbee & Co., Detroit, motor truck manufacturers, are arranging for larger factory quarters and will increase their equipment.

The A. F. Cramer Company, Detroit, has been organized by Henry C. Weidman and others with a capital stock of \$20,000. The new company will manufacture stoves and other metal products.

The Barr Mfg. Company, Detroit, maker of automobile parts and marine engines, has increased its capital stock from \$40,000 to \$50,000 and changed its name to the Detroit Motor & Machine Company.

The C. C. Wormer Machinery Company has purchased the plant and equipment of the Cook Mfg. Company, Albion, Mich., manufacturer of gasoline engines, at receivers' sale. The purchaser is not yet ready to announce its intentions in regard to the plant.

The Detroit Matchless Stove Lighting Company, Detroit, has been organized with \$10,000 capital stock to manufacture a device for lighting stoves. The stockholders include Louis V. Roulet, Nathan Van Vliet and Fred Q. Nicholson.

To manufacture and deal in plumbers' and steam-fitters' supplies, the Michigan Plumbing Supply Company, Detroit, has been organized with a capital stock of \$25,000. The incorporators are Edward F. Klein, Milo H. Crawford and McKee Robinson.

The England Fastener Company, Detroit, has been incorporated with \$10,000 capital stock by Arthur E. England, Nicholas J. Fleming and others. The new company will engage in the manufacture of special stamped metal goods.

The Universal Valve Company, Grand Rapids, Mich., has been incorporated with \$20,000 capital stock to manufacture and deal in patented devices for use in connection with sprinkler systems. The stockholders include John T. O'Brien, Wellington G. Sargent and Martin Downs.

The Peninsular Power Company, Madison, Wis., has been granted a Michigan charter to incorporate with \$850,000 capital stock, by the State Railroad Commission. The company is constructing a hydroelectric plant on the Wisconsin-Michigan state line near Iron Mountain, Mich. E. W. Mead of Madison is the chief engineer.

The Kalamazoo Gas Company, Kalamazoo, Mich., is planning extensive betterments and additions to its plant, including the construction of a new purifying plant, a meter house and oil tanks of large capacity.

Goodwillie Brothers, operating a box factory at Manistique, Mich., are having plans prepared for additional buildings which they contemplate erecting this summer.

The Escanaba Chemical Company, Escanaba, Mich., has been organized to take over the property of the Calumet Chemical Works, manufacturer of baking powder. R. E. Valentine is manager of the new company.

The Korff Mfg. Company, Lansing, Mich., manufacturer of go-carts, etc., has increased its capital stock from \$20,000 to \$40,000.

The H. S. Willing Company, Detroit, has acquired a large plant at Port Huron, Mich., and will utilize it for the manufacture of overalls and other goods.

The Michigan Limestone & Chemical Company, operating a plant in Presque Isle County, Mich., has increased its capital stock from \$500,000 to \$1,000,000. The company's executive offices are at 55 Liberty street, New York City.

Charles Brown, Midland, Mich., will establish a fire-proof sawmill at that place.

## Cincinnati

CINCINNATI, OHIO, May 28, 1912.

With very few exceptions, local machine tool builders report a steadily increasing business. The majority of orders are either from the export trade, or from customers in the East, but a fair share of business is coming from the West. The South appears to be the duldest part of the country just now, so far as the machine tool industry is concerned.

Second-hand machinery dealers report another spurt of activity, and the boiler business is also showing signs of improvement. The foundries are more active than for some time.

Plans for the proposed plant of the Cincinnati Gear Company, recently mentioned, have been completed, and work on the new structure will be begun within the next few days.

Negotiations are pending for the erection of a large modern factory building in Oakley suburb, by the Cincinnati Ball Crank Company. No details have as yet been given out as to the size of the proposed structure.

The Columbia Cement Shingle & Tile Company, Cincinnati, has been incorporated with \$10,000 capital stock, and will erect a factory at Columbia and Bonnell avenues. John Mueller and M. C. Roth are named among the incorporators.

The H. L. Brown Fence Company, Cincinnati, has acquired a site in Oakley suburb, on which it will erect

a large modern factory building. Considerable electrical and other special equipment will be required.

The Eagle White Lead Company, Cincinnati, has taken out a permit for the erection of a four-story reinforced concrete building, on a site adjoining its present plant at Hunt street and Broadway.

Schwartschild & Sulzberger, Chicago and Kansas City, have acquired a site at Lockland, Ohio, on which will be erected an immense packing house. A large amount of refrigerating and electrical equipment will be required to fit out the proposed plant.

The McInnes-McCleary Foundry Company, Wellsburg, W. Va., has been recently incorporated with \$10,000 capital stock, to do a general jobbing foundry business. Collin McInnes and James P. McCleary are the principal incorporators.

The Wilborn Oil Works, Covington, Ky., has let contract for a boiler house addition to its plant. In addition to two boilers the company will also probably require a small generator.

The Heer Engine Company, Portsmouth, Ohio, which is arranging for extensive additions to its plant, will soon be in the market for some special machine tools and other equipment.

The J. & F. Schroth Packing Company, Cincinnati, is reported to be in the market for additional power plant equipment.

The Owensboro and Rockport Bridge & Terminal Company, A. H. Kennedy, president, Owensboro, Ky., announces that it proposes to build a bridge across the Ohio River at that point. Contract for the necessary structural material has not yet been let.

The R. F. Johnston Paint Company, Cincinnati, has acquired the former home of the Consumers' Ice & Refrigerating Company, on Spring Grove avenue, and the building will be fitted up for turning out different kinds of paints. In addition to transmission equipment some electrical machinery will be required. The company's present headquarters are at 228 Main street.

The National Machine Tool Company, 128 Opera place, Cincinnati, has purchased a site at Spring Grove and Queen City avenues, on which it intends to erect a factory large enough to take care of its fast increasing business. The company manufactures key-seating and oil grooving millers. Herman A. Holx is president.

## Indianapolis

INDIANAPOLIS, IND., May 28, 1912.

The Laycock Power House Company, Indianapolis, has been sold to the General Industrial & Mfg. Company, for \$350,000. Thomas B. Laycock, president of the Laycock Power House Company, is interested in the new company. The industrial building is one of the largest of its kind in the city, having 380,000 sq. ft. of floor space.

The Automatic Machinery Manufacturing & Sales Company, Indianapolis, has been incorporated with \$300,000 capital stock to manufacture machinery for bottling works. The directors are R. G. Hemingray, I. D. Lambertson, J. A. Hook, P. W. McAbee and W. E. Evans.

The Cottage Construction Company, Indianapolis, has increased its capital stock from \$150,000 to \$225,000. C. N. Thompson is president and F. T. Reed, secretary of the company.

The Nesom Motors Company, Indianapolis, has been incorporated, with \$200,000 capital stock, to manufacture automobiles, engines, tools, etc. The directors are C. T. Nesom, F. B. Brown and S. Sagalowsky.

The Kennedy Car Liner & Bag Company, Shelbyville, Ind., has been incorporated, with \$50,000 capital stock, to manufacture paper and bags. The directors are F. W. Kennedy, B. F. Swain and P. G. Hunker, Jr.

Plans are being prepared by order of the Town Board for a waterworks system for West Terre Haute, Ind. The estimated cost is \$35,000.

The Consolidated Stone Company of Bedford and Bloomington, Ind., has bought the mill of the Dugan Stone Company and will enlarge the plant.

The Hawks Electric Company, Goshen, Ind., is preparing plans for the erection of additional power generating capacity.

The Maple City Mfg. Company, Goshen, Ind., has been incorporated with \$10,000 capital stock, to do a general manufacturing business. The directors are W. E. Deutsch, D. M. Bechtel and J. T. Shepard.

The Indiana Auto-Toto Company, Muncie, Ind., has been incorporated, with \$30,000 capital stock, to manufacture vending machines. The directors are R. C. White, H. Hobbs and S. A. Martin.

The H. W. Reed & Sons Construction Company, Mishawaka, Ind., has been incorporated, with \$10,000



capital stock, to do a general construction business. The directors are H. W. Reed, W. F. Reed and J. C. Reed.

The Indiana Motor & Mfg. Company's plant, Franklin, Ind., was sold by the receiver, the Security Trust Company, Indianapolis, to Frank M. Millikan, for \$20,000. The company makes automobiles.

The Ross Gear & Tool Company, Lafayette, Ind., has increased its capital stock by issuing \$100,000 preferred stock.

The American Play Ground Device Company, Terre Haute, Ind., has increased its capital stock from \$10,000 to \$20,000.

The Eclipse Dump Box Company, Hammond, Ind., has been incorporated, with \$20,000 capital stock, to manufacture dump boxes. The directors are John Shepherd, Robert Matthias and G. B. Sheerer.

## The Central South

LOUISVILLE, Ky., May 28, 1912.

The general situation in machinery circles is reported quiet, but the condition is generally pronounced to be a seasonable one. The number of inquiries received the past week has been smaller than usual, and the volume of sales has shown a decrease compared with the business at this time last year. The general feeling, however, is that the outlook is satisfactory, with the prospect of June developing a fair amount of business. Building operation continued to take a large amount of equipment.

A development worthy of comment is the large number of improvements being made in the eastern Kentucky coal district. This applies not only to new mines, but also to older operations. Mine operators who have been getting out their coal by hand and selling it without grading to the railroads have found that by installing modern conveying systems, washers, etc., they have been able to enter the more profitable fields of commercial and domestic business. Consequently, the demand for power-plant cutting and conveying machinery, as well as special equipment, is growing rapidly.

McDonald & Dodd, Louisville architects, who will supervise the construction of a 15-story office and mercantile building for John P. Starks in this city, have announced that the contract will be let from the offices of D. H. Burnham & Co., of Chicago. Bids will be received in about six weeks. The building will have its own power plant and will be equipped with four elevators.

The Farmers' Tobacco Warehouse Company of Cynthia, Ky., will install several large hydraulic presses in the loose leaf warehouse which it is erecting in Cynthia.

The Commercial Club of Harlan, Ky., is considering the project of establishing a waterworks system in that city.

S. G. Ragsdale, Pembroke, Ky., has under consideration plans for the construction of an electric light plant at Cadiz, Ky.

The Consolidation Coal Company of Baltimore, Md., which is developing coal property in Eastern Kentucky, is erecting a power plant on Elkhorn River, near Jenkins, Ky. It will serve several of the industrial communities which are being established by the company.

The Kentucky Solvay Coke Company, Ashland, Ky., which was recently incorporated with a capital stock of \$650,000, has elected the following officers: R. G. Hazard, president; E. C. Witherby, vice-president and general manager, and J. G. Hazard, secretary and treasurer, all of Syracuse, N. Y. Mr. Witherby will be in active charge of the construction plans, which will be ready within 30 days. In addition to large coke ovens a by-product plant will be erected.

Knight & Bell, Hopkinsville, Ky., have purchased 600 acres of timberland in Trigg county, Ky., and will erect a large sawmill on the property.

The Gunther-Wright Machine Company, Owensboro, Ky., has the contract for the installation of a 50-hp. engine and a 100-hp. engine in motor boats which are being constructed by Erdix Rounds.

The Swann-Moore Tobacco Company, Murray, Ky., has purchased a building and will manufacture tobacco.

The Interstate Coal Company, Barbourville, Ky., has purchased the holdings of the Cumberland Coal Company, in the Brush Creek district. Several new mines will be open by the Interstate company.

The Chattanooga Railway & Light Company, Chattanooga, Tenn., which is associated with the recently organized Tennessee Power Company, will spend \$250,000 in improvements and extensions. Details of the improvements have not been announced.

The Dan Shea Boiler Works, Memphis, Tenn., had been incorporated with \$20,000 capital stock by Edward T. Shea, Daniel Shea, Jr., and others. It is a going concern.

Arlington, Tenn., is planning the installation of a water plant, the estimated cost of which is \$10,000. R. C. Huston, Memphis, Tenn., is drawing the plans.

Although floods in the South have interrupted the demand, the Dixie Logging Tool Company, Chattanooga, Tenn., reports an excellent call for logging equipment. Fred, William and Emil Stocker are members of the company.

The Arctic Ice Company, Chattanooga, Tenn., is planning the installation of the considerable amount of new equipment. E. O. Wells is vice-president of the company.

The Citico Furnace Company, Chattanooga, Tenn., which has closed its plant, will make extensive repairs before resuming operations.

The elevator of R. A. Smith & Co., Lynnville, Tenn., was destroyed by fire May 20, with a loss of \$30,000. The elevator, which was recently improved, is to be rebuilt.

The Hughes Elevator & Warehouse Company, Nashville, Tenn., suffered the loss of its plant by fire. The elevator is to be rebuilt in the immediate future. H. H. Hughes is president of the company.

Frank L. Fuller, New York, will establish a gas plant at Concord, N. C.

The Gibbes Machinery Company, Columbia, S. C., has begun the erection of a foundry, machine shop, etc., to replace the plant which was recently destroyed by fire.

The R. W. Whitehurst Company, Norfolk, Va., will rebuild its agricultural implement factory which was recently burned. The estimated cost of the new plant with equipment is \$125,000. A list of the machinery required has not yet been prepared but will be issued shortly.

## Birmingham

BIRMINGHAM, ALA., May 27, 1912.

The machinery market, owing to the advancing season, the dry weather, which has made roads and traffic better, and to increasing activity in sawmills, has improved in the past week. A number of stop orders issued on engines and boilers intended for inundated territory have been recalled and the material is being shipped. There are many inquiries, the special demand being apparently for boilers, engines and lathes. There is not a great deal doing in the pump line, the mines being less active than for some time past. The demand for mill supplies is also showing improvement. The machinery trade altogether shows signs of steady improvement all along the line, especially with sawmills. A fair amount of business has been booked and there is improvement over conditions prevailing during the past two weeks or so.

The shingle mill of the Perdido Shingle Company at Bay Minette, Ala., was burned recently.

The Cordele Compress, Cordele, Ga., has been incorporated with a capital stock of \$25,000. J. K. Livingston is president.

The Etowah Marble & Granite Company, Marietta, Ga., with a capital stock of \$25,000, has been incorporated. W. M. Fleming is president.

The Macon Cabinet Works, Macon, Ga., suffered a loss of \$15,000 to \$20,000 by fire.

The plant of the Florida Spring Bed Company, Jacksonville, Fla., J. C. Connally, president, was damaged by fire. The loss is \$20,000, with \$10,000 insurance.

Chamber of Commerce, Tifton, Ga., through Tift, Banks & Myers, has completed arrangements for building a \$32,000 compress.

It is reported that B. B. Comer, Birmingham, cotton mill operator, will erect another mill near Birmingham.

The Berner Ginning Company, Berner, Ga., has been organized to build a ginnery.

The Fruit Growers' Exchange will establish an ice plant and cold storage at High Springs, Fla.

The Consolidated Ice & Power Company, Valdosta, Ga., is arranging to double the capacity of its ice, power and light plants.

Jesup, Ga., has voted a bond issue of \$35,000 for establishing light plant, etc.

It is announced in Macon, Ga., that negotiations are complete for establishing a \$200,000 power plant by the Georgia Public Service Corporation to supply power for street car system and lighting for citizens. Contracts for some machinery have been let. W. J. Massee is president.

The Atlantic Fire Proof Construction Company, Birmingham, has been organized with a capital stock of \$100,000 by J. S. B. Thompson of Atlanta, Ga., and others.

The Woodward Iron Company will soon commence the construction of an immense water reservoir with a capacity of 2,000,000,000 gal.

The Eureka White Marble Quarries, Montgomery, Ala., has been chartered with a capital stock of \$100,000. G. W. Grayson of Biloxi, Miss., is president.

The city of Huntsville, Ala., has adopted an ordinance exempting new industries from taxation for 10 years.

The Imperial City Market, Cold Storage & Warehouse Company, Birmingham, has been incorporated with a capital stock of \$1,250,000. J. F. Donahoo is president. An ice and cold storage plant, etc., are planned.

The Southern Construction Company, Pensacola, Fla., has completed a creosoting plant.

The Manchester Sawmill Company, Manchester, Ala., Albert Russell, manager, will buy machinery to replace that destroyed by fire.

Evans Bros., Birmingham, will erect a cold storage plant for the Birmingham Packing Company.

The Virginia-Carolina Chemical Company has let a contract to a Birmingham concern for the construction and equipment of a sulphuric acid plant at its fertilizer plant, Shreveport, Ala. It will cost about \$150,000.

The Southern Steel & Iron Works, Jacksonville, Fla., has been formed with \$250,000 capital stock to absorb the Jacksonville Iron Works and to equip a plant for the manufacture of steel, iron, bronze and aluminum castings.

The Strickland Bros. Machine Company, Tuscaloosa, Ala., has been given a contract for the valves and other equipment to be used on the United States Government Lock on Black Warrior River.

Athens, Ala., will issue bonds for the improvement and extension of its waterworks and the electric light plant. About \$20,000 will be spent. A. P. Henderson is city engineer.

The city of Hartselle, Ala., will issue bonds for the improvement and extension of its waterworks and the electric light plant. About \$20,000 will be spent. A. P. Henderson is city engineer.

The municipality of Opelousas, La., will receive bids through the board of commissioners of the first sewerage construction for building a system of sanitary sewers, comprising about 10 miles of 18 and 6-in. pipe and accessories and an Imhoff purification plant. Walter G. Kirkpatrick, Farnham Building, Birmingham, Ala., is the engineer in charge.

## St. Louis

St. Louis, Mo., May 27, 1912.

Trade continues in the even tenor it has pursued in the St. Louis market in recent weeks, and the machine tool dealers have become so accustomed to it that they do not look for any decisive gain until the political agitation has become a thing of the past. No large lists are making their appearance and the orders continue in the rut of single tool type. However, the aggregate is not discouraging.

The syndicate which is planning the construction of a hydroelectric plant on the Ouchita River in Arkansas to supply a large number of cities has adopted the name of the Garland Power & Development Company. P. J. Hannan of St. Louis and C. J. Beard of Kansas City are the leaders.

The plant of the Standard Adding Machine Company, St. Louis, has been sold to a syndicate headed by E. A. Grant of Cleveland, Ohio, for \$100,000, who will reorganize the company and will re-equip the factory.

The Shelley-Gould Mfg. Company, St. Louis, with \$20,000 capital stock, has been organized and will at once equip a plant for the manufacture of baking powders and similar products. M. B. Shelley, J. C. Carter and A. C. Gould are the principal stockholders.

The Lillie Construction Company, St. Louis, has been awarded the contract for the construction of the waterworks extension at Webster Groves, Mo. Sub-

contractors are the United States Cast Iron Pipe Company, James B. Clow & Sons and the Iowa Valve Company.

The Light & Development Company, St. Louis, which operates public service companies in a number of cities, has increased its capital stock from \$20,000 to \$1,000,000 for the purpose of extending its operations. Hugo Wurdack is president. Its offices are in the Wright Building.

L. J. Cohen & Co., Kansas City, Mo., have leased a factory building in St. Louis and will establish a plant for the manufacture of brass goods.

The Osceola Light & Water Company, Osceola, Mo., has been incorporated with \$25,000 capital stock by C. R. Hunt, A. M. Seddon and A. W. Burton to equip a public service plant under franchises already obtained.

The American Sash & Door Company, Kansas City, Mo., has been financed in St. Louis, to effect the merger of The Roach & Kinzie Company of Kansas City, the Huttig-Moss Company, St. Joseph, and other wood working plants at Kansas City, St. Joseph and other points.

The Southwestern Blaugas Company, with \$3,000,000 capital stock, has been chartered to build a plant at Kansas City, Mo., the initial unit representing a cost of about \$500,000. The incorporators are Dr. Hugo Lieber, New York; A. A. Godard, Topeka, Kan.; W. F. Rankin, Theodore Gary, F. S. Hastings and A. F. Adams of Tarkio, Mo. This is the eighth branch of the company, which has headquarters in New York City.

The High Bird Mining Company, St. Louis, with \$60,000 capital stock, has been incorporated by Max L. Schwarzkopf, C. D. Davis and B. J. Brown to operate properties owned by the stockholders.

The Coates-McDonald Aero Unicycle Company, St. Louis, with \$30,000 capital stock, has been formed by William McDonald, C. T. Coates and W. N. Sturgis to build a newly invented one-wheel power vehicle recently tested here and found capable of making remarkably high speed.

The Valier & Spies Milling Company, St. Louis, has begun the construction of the large new grain elevator for which it bought the site as reported recently.

The Minnetonka Oil & Gas Company, Dexter, Mo., has been organized with \$100,000 capital stock by A. C. Spiker, J. W. Miller, S. Ulen, James Greer, James A. Reed, George Grant, William Miller, H. G. Francis and J. H. Cummings to develop properties owned by the stockholders.

The Southern Cotton Protecting Association, recently incorporated at Oklahoma City, Okla., will construct plants for treating cotton in the bale to make it impervious to cinders, sparks, etc. The officers of the company are C. B. Haley, president; Clarence Owen, treasurer; Perry Steadham, secretary, all of Oklahoma City.

The city of Lincoln, Neb., is figuring upon the installation of a municipal electric lighting plant the cost of which is estimated at \$225,000.

The city of College View, Neb., has authorized the issuance of bonds to the amount of \$25,000 for the construction of a municipal water plant.

The American Refrigerator Transit Company, St. Louis, suffered a loss of \$8,000 as a result of fire in its machine shop the major portion of the damage being to machinery.

The Dickson Automatic Governor Company, Salt Lake City, Utah, has begun the construction of a modern plant for the manufacture of a patented governor and will soon be in the market for its equipment.

J. D. Johnson, Newport, Ark., is in the market for a 12-hp. hoisting engine.

## Texas

AUSTIN, TEXAS, May 25, 1912.

Interest in the development of irrigation by means of shallow wells and the installation of pumping plants, a movement which already covers a considerable territory in the pan-handle region of Texas and eastern New Mexico, has spread to other parts of this State. The demand for pumping outfits of this character in the vicinity of Alpine, Van Horn and other localities is increasing rapidly. Several large irrigation projects are also on foot in different parts of southern and western Texas which will require large pumping plants. Crop prospects all over the State continue very favorable. Money is said to be more plentiful than usual and it is not expected that there will be any falling off in the machinery trade during the summer months.

The Kingsville Cotton Oil Company has adopted plans for erecting an oil refining and by-product plant



at Kingsville. The plant will cost about \$50,000. R. G. Flato is manager.

H. Alford & Son have finished the installation of a bottling factory at Caldwell.

W. Overstreet will establish a fertilizing plant near Burnet. He will also install machinery for mining rock asphalt upon a tract of land near Burnet, recently purchased.

A. S. Killingsworth is installing a new cotton gin at Jerrell.

Dr. A. H. Evans and associates purchased 25,000 acres of land in the valley of the Rio Grande near Eagle Pass and are preparing to construct a system of irrigation. The water supply will be obtained from the Rio Grande by means of a pumping plant.

Colley & Billingsley contemplate installing an electric light and power plant at Stockdale. They are now putting up a new ice factory.

Z. T. Northcutt and J. T. Northcutt, owners of the South Plains Tile Company, will establish a large plant at Plainview for the manufacture of drainage and irrigation tile.

The Denton Pressed Brick Company will double the capacity of its brick making plant at Denton. Eight new kilns will be built.

Preparations are being made for establishing a water works plant and distributing system at Cooper.

C. W. Post, of Battle Creek, Mich., is promoting the establishment near Justiceburg, Texas, of a plant for the manufacture of cement which will utilize a large deposit of the raw material that was recently discovered adjacent to this place.

The municipal water works plant at Wichita Falls is being improved by the construction of a second basin of reinforced concrete 90 x 230 ft., and the installation of a new pump with a capacity of 2,000,000 gal. daily.

The Highland Oil Company, Houston, has been organized with a capital stock of \$6,000. The incorporators are W. A. Paddock, G. W. Mennis, J. D. Patrick and F. L. Hugges.

The Postex Cotton Mills has been organized with a capital stock of \$550,000 for the purpose of erecting a plant for the manufacture of cotton fabrics at Post. The incorporators are C. W. Post, Arthur B. Williams, Henry C. Hawk, of Battle Creek, Mich.; Horatio W. Fairbank and James F. Hartford, of Post.

The Post Power Company will install an electric light and power plant at Post. The company has a capital stock of \$100,000. C. W. Post, of Battle Creek, Mich., is at the head of the project.

The work of constructing a municipal sewer system at La Grange will soon be started. Bonds in the sum of \$17,000 have been issued for the purpose. H. W. Speckle is Mayor.

Galveston Ice & Cold Storage Company, Galveston, has been organized with a capital stock of \$250,000. The incorporators are Waverly Smith, J. H. Langbehn and John Sealy.

The Farmers Gin Company will install a cotton gin at Orange Grove. The stockholders are William Green, Philip Welhausen and B. Cornelius.

The Tecumseh Oil & Cotton Company, Sherman, has increased its capital stock to \$100,000 from \$75,000. It will make improvements to its plant.

The Shiner Oil Mill & Mfg. Company, Shiner, which has increased its capital stock to \$50,000 from \$30,000, will make improvements to its oil mill there.

The Border Rubber Company of New York has been granted a permit to do business in Texas. It will establish a factory for the manufacture of crude rubber from the guayule shrub at some point in West Texas.

The electric light and power plant and the factory at Kerryville has been sold by G. A. Maurer to T. Holdsworth. Additions and improvements will be made to the plants.

The Grogan Mfg. Company, of Bivins, has increased its capital stock to \$60,000 from \$10,000.

The Rule Cotton Oil Company, which recently increased its capital stock from \$50,000 to \$80,000, will make improvements to its cotton-seed oil mill at Rule.

The Cummer Grate Factory, of Paris, which was recently destroyed by fire entailing a loss of \$40,000, will be rebuilt.

The Nordheim Business Men's Club is promoting the establishment here of a water works plant and distributing system at Nordheim.

The Alfalfa Meal Millers Company, San Francisco, Cal., will install an alfalfa plant at Caldwell, N. M., at a cost of \$15,000.

The Farmers & Ginners' Oil Mill, Sulphur Springs, which was recently destroyed by fire at a loss of \$75,000, will be immediately rebuilt.

C. H. Lester has awarded the contract to Ely &

Dymond for the installation of an irrigation pumping plant upon a tract of land near Deming, N. M.

The Needle Smelting & Refining Company will install an addition to its reduction mill at its mine near Ray, Ariz.

The McMillen-Stonewall Mining Company will install a new hoist and air compressor at its Stonewall Jackson mines, 16 miles northeast of Globe, Ariz.

Preparations are being made for the installation of a municipal hydroelectric plant on the Hualahuises River to furnish lights and power for the town of Hualahuises, State of Nuevo Leon, Mexico.

The Federal Government of Mexico has ordered a large amount of equipment for new wireless stations that it will install in different parts of that country. These stations will be located at interior points in order to perfect a system of wireless communication to all parts of the republic.

T. J. Hannan, of St. Louis, Mo., and associates are making preparations to install a large hydroelectric plant on the Ouichita River in Arkansas. They will construct power transmission lines to Little Rock, Hot Springs, Pine Bluff, Argenta and other industrial centers. The proposed plant and power system will cost about \$2,000,000, it is stated.

S. C. Tucker will remodel and enlarge the cotton gin at Brownsville, which he recently purchased from the Planters Gin Company. Mr. Tucker and associates are erecting a large cotton-seed oil mill at that place.

The Lordsburg Water & Electric Company is installing a 500-hp. electric power plant at Lordsburg, N. M., and will construct transmission lines to mines in the Shakespeare district for the purpose of providing power for the operation of machinery.

The Indiana Canal Company will install additional pumps in its irrigation pumping plant near Brownsville, Texas. The company is also enlarging its canal system and will provide water for about 10,000 acres.

Patricio McLane has made application to the Government department of Fomento of Mexico for a concession to establish a hydroelectric plant on the Valles River in the state of San Luis Potosi.

Valentine H. Lions, Jr., will install a hydroelectric plant on the Minas River in the state of Vera Cruz, Mexico. He has made application to the Federal Government for a concession for the project.

## Eastern Canada

TORONTO, ONT., May 27, 1912.

The Brantford Carriage Company, Ltd., Brantford, Ont., recently mentioned as having an addition to its plant in course of erection, will soon be in the market for equipment which includes wood working tools, shafting, hangers, electric motors and probably an equipment of dry kilns.

The Victor Electric Company, Ltd., Guelph, Ont., has been incorporated with a capital stock of \$20,000 and will engage in the manufacture of electric appliances. Archibald H. Macdonald, Kelly Evans and Albert Wicks are among the directors.

The Interlake Tissue Mills, Ltd., St. Catharines, Ont., has completed plans and awarded contract for the construction of a paper mill 100 x 208 ft., two stories, for the manufacture of tissue paper.

The city of Hamilton, Ont., is receiving bids through City Clerk S. H. Kent for pumping equipment to be installed in the Beach Pumping Station, including two units of turbine pumps of 6,500,000 imperial gal. daily capacity each for direct connection to synchronous motors, two units of synchronous motors with transformers, switching apparatus and accessories complete.

The American Radiator Company of Canada, Ltd., Brantford, Ont., has been incorporated with a capital stock of \$500,000, at which place the Canadian branch plant of the American Radiator Company is to be established. The incorporators are Clarence Mott Woolley, John B. Pierce, Charles M. Parker, William H. Hill, Charles K. Foster and Frank Whitelaw, of Chicago, and Charles H. Hodges, Detroit.

The Meaford Furniture Mfg. Company, Meaford, Ont., has completed plans for an addition to its plant which it will build this spring. The cost is estimated at \$40,000.

The Berlin Machine Company will erect machinery works in Berlin, Ont., to cost \$14,000.

The by-law for a municipal loan of \$10,000 to the Two-in-One Auto Company, Amherstburg, Ont., to be used in erecting suitable factory buildings, was carried. The company was recently formed and is composed of local and Detroit capitalists.

The Board of Trade at Colborne, Ont., has under consideration proposals for the establishing of a Canadian branch of the Ohio Motor Car Company's works in the town. A Canadian company has been incorporated for the purpose. The factory is expected to be ready to operate in the autumn.

It is stated that six large grain elevators will be built at Port Arthur, Ont., this year.

The Kingston Shipbuilding Company, Kingston, Ont., has increased its machinery equipment.

The British Canadian Shipbuilding Company asks the city of Sydney, N. S., for \$1,000,000 bonus and a maximum assessment of \$500,000 for 20 years. The company will guarantee to spend at least \$5,000,000 for the largest dock in the world; to spend not less than \$1,000,000 for a shipbuilding plant; to spend on works not less than \$6,000,000 and to finance sewer and street extension necessary in connection with the proposed works to the extent of \$500,000, payable by the city in 10 years.

The Aberthaw Construction Company, Boston, has been awarded a contract for the erection of the new plant of the American Cyanide Company at Niagara Falls, Ont., which will comprise a group of four factory buildings and an electric furnace building.

Bowman & Connors, engineers, Berlin, Ont., are receiving bids for waterworks to be built at Fergus, Ont., including water tower pumping machinery, valves, hydrants, etc.

The Capital Wire Cable & Mfg. Company, Ltd., Ottawa, Ont., has been incorporated with a capital stock of \$40,000 and will build a plant. John R. Buchanan and Robert G. Code are among the incorporators.

The Copp-Clark Stationery Mfg. Company, Toronto, Ont., has completed plans for a large addition to be made to its plant.

Mayor George H. Lee, Hamilton, Ont., is receiving bids for the erection of an electric power station on Houghton street North, from plans prepared by E. J. Sifton, consulting engineer.

The Canadian Cataract Rubber Company, Welland, Ont., has been incorporated with a capital stock of \$250,000 and will build a plant for the manufacture of automobiles and other kinds of rubber tires and specialties in rubber goods. E. J. M. Block and J. Dilcher of Buffalo and L. B. Spencer, Colonel Raymond and M. A. Overholt, Welland, are the provisional directors.

The Toronto Carpet Company, Toronto, Ont., will erect an additional factory adjoining its present plant at an estimated cost of \$100,000.

The Dundas Linen Mills, Ltd., Iroquois, Ont., has been incorporated with a capital stock of \$100,000 by Robt. Caldwell and others and will build a manufacturing plant.

The main building of the Farmers' Binder Twine Company's plant, Brantford, Ont., was destroyed by fire May 20 together with the machinery. Loss, \$75,000. The plant will be rebuilt.

## Western Canada

WINNIPEG, MAN., May 23, 1912.

The industrial outlook continues favorable in western Canada. The general prosperity stimulates all classes of work. Crop conditions so far are good; various industrial concerns are busy filling orders for all classes of materials; investors are placing a large amount of capital throughout the country; new immigrants are bringing in a great deal of money in the aggregate and on every hand there are evidences of good times. The machinery houses continue to report an active demand for the different lines and if the indications of a satisfactory grain output continue the remainder of 1912 should be of a satisfactory character in these provinces.

A report from Fort Frances, in western Ontario, says that the J. L. Owens Company of Minneapolis has had a representative in that district looking into the matter of a site for a Canadian branch factory. It is also said that the company has purchased two acres at Duluth Junction for that purpose.

The Lake of the Woods Milling Company, Ltd., Montreal, has let a contract to the Carter-Halls-Aldinger Contracting Company, Winnipeg, for the erection of a large grain elevator at Keewatin.

The city of Brandon, Man., has decided to establish a street railway system as a municipal enterprise, J. D. McGregor having relinquished his franchise. A by-law will be submitted to the citizens to raise \$300,000 for the purpose.

The Mayor of Fort William announces that the Canadian Car & Foundry Company, Montreal, has signed an agreement to construct a large car works at

Fort William. Negotiations have been under way for several weeks.

The Page-Hersey Company, manufacturer of wire and other iron and steel products, Galt, Ont., has made a proposition to the city of Fort William for the establishing of a branch industry there.

Word has been received from London, England, to the effect that J. H. Haslam, of Regina, Sask., has completed the formation of a \$5,000,000 concern with British capital to exploit the coal areas of Estavan, Sask.

The Canadian Pacific Railway Company will build a mill at Coaldale, near Lethbridge, Alberta, for the treatment of alfalfa, to prepare it for market.

C. C. Ballantyne, vice-president and managing director of the Sherwin-Williams Company of Canada, Ltd., Montreal, has been in Winnipeg arranging for the enlargement of the company's factory and warehouses here. It manufactures paints, linseed oil and kindred lines.

J. R. Ness, manager of the Ontario & Manitoba Flour Mills, Ltd., Ottawa, confirms the report that his firm is preparing to erect a large flour mill at Regina, Sask.

The Hoeschen Wentzer Brewing Company, Saskatoon, Sask., will add to the capacity of its plant to the extent of \$20,000. The architect is Otto Tuhr, Chicago, and the general contractor, O. Teary, Saskatoon.

The Doak Lumber & Mfg. Company, Saskatoon, will erect a new sash and door factory and planing mill.

## Government Purchases

WASHINGTON, D. C., May 27, 1912.

The Bureau of Supplies and Accounts, Navy Department, Washington, will open bids June 11, under schedule 4580, for one boring and turning lathe delivered to Washington.

The United States Engineer office, New London, Conn., will open bids June 15 for furnishing turbine generators, condensers, synchronous converters and a voltage regulator.

The Constructing Quartermaster, Fort Howard, Md., will open bids June 17 for furnishing and installing two boilers and accessories in power plant, making additions to power house and for sinking 10-in. tubular deep well.

The Depot Quartermaster, Washington, D. C., will open bids June 15 for furnishing laundry plant equipment.

The Constructing Quartermaster, Fort Myer, Va., will open bids June 12 for the removal of old boilers and substituting new ones in the Post Hospital, Annex Building.

The Bureau of Supplies and Accounts, Navy Department, Washington, will open bids June 18, under schedule 4599, for one steam duplex air compressor, one vertical feed water heater, one direct current electric locomotive, two centrifugal machines and one hydraulic press for power.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids May 21 for material and supplies for the Navy Yards as follows: Schedule 4505, class 79, one high speed motor driven friction cut-off saw. Bidder 137, John T. Ryerson & Son, Chicago, Ill., \$1,625.

The Cincinnati Iron & Steel Company, Cincinnati, Ohio, has issued a new iron and steel stock list. This contains a complete list of everything carried in the company's warehouse and yard and the amounts given are those which the company ordinarily has in stock at all times. One of the special features of the list is the use of a thumb index to facilitate locating the pages upon which the stocks of the different kinds of structural material, sheets, bars and tool steel may be found. Particular attention is called to the package car service maintained to a large number of points reached by rail from Cincinnati which enables goods to be received in some cases earlier than regular express shipments.

Ira A. Thomas has been elected president, and C. R. Thomas secretary and treasurer of the Sykes Metal Lath & Roofing Company, Niles, Ohio, whose property they recently acquired. The reorganized company has been capitalized at \$100,000 and will retain its present name. It is an entirely independent concern and will continue to operate as such. No radical changes are proposed by the new owners.



## Judicial Decisions of Interest to Manufacturers

ABSTRACTED BY A. L. H. STREET

**RIGHT TO END EMPLOYMENT CONTRACT.**—Under the law of New York, a contract of employment may be terminated by either party at any time, unless a definite term of service is agreed upon. (New York Court of Appeals, *Watson vs. Gugino*, 98 Northwestern Reporter 18.)

**EMPLOYER'S RESPONSIBILITY FOR WORKMAN'S NEGLIGENCE.**—A manufacturer of machinery is not liable for personal injury to a factory employee negligently caused by its employee, while installing in a customer's factory a machine not purchased from the manufacturer but installed in connection with a machine sold by the manufacturer; the negligent employee being under the customer's control in doing the particular work from which the accident resulted. (New York Supreme Court, Fourth Appellate Division; *Casey vs. Davis & Furber Machine Company*; 134 New York Supplement 355.)

**PROTECTION OF TRADE SECRETS.**—Where an employee expressly or impliedly agrees that he will not divulge his employer's arts or unpatented inventions, he can be enjoined, individually or jointly with others, from disclosing the secrets or from using them in competition with the employer. The employee can, also, be held responsible for injury resulting to the employer from breach of his duty not to divulge the trade secrets. (Massachusetts Supreme Judicial Court, *American Stay Company vs. Delaney*, 97 Northeastern Reporter 911.)

**RISK OF INJURY NOT ASSUMED BY WORKMAN.**—An employee does not assume the risk of being injured through the employer's failure to guard machinery as required by statute. (Pennsylvania Supreme Court, *Amiano vs. Jones & Laughlin Steel Company*, 82 Atlantic Reporter 780.)

**EMPLOYERS' LIABILITY INSURANCE.**—When an employer's liability policy indemnifies him against loss and not merely against legal liability, on account of injury to a workman, actual loss to the employer must appear before he can recover on the policy. (Indiana Appellate Court, *Campbell vs. Maryland Casualty Company*, 97 Northeastern Reporter 1026.)

**DAMAGES RECOVERABLE FOR BREACH OF CONTRACT.**—On breach of a contract to sell pipe, etc., taken from a wrecked building, the buyer's recoverable damages are measured by the general market price of the materials and not by the price at which he could have resold in a special market of his own. (New York Supreme Court, Appellate Term; *Foster vs. Hudson Wrecking & Lumber Company*, 134 New York Supplement 34.)

**PAYMENT OF NOTES.**—If the maker of a note pays the amount thereof to the original payee, without production of the note, he does so at his own risk; such payment not discharging the debt if the note has been transferred to another, unless the latter authorized the payee to receive payment. (Arkansas Supreme Court, *Miles vs. Dodson*, 144 Southwestern Reporter 908.)

**DAMAGES RECOVERABLE FOR TRADEMARK INFRINGEMENT.**—One whose trademark has been infringed can recover all profits made by the infringer under color of the infringement. (United States Circuit Court of Appeals, Third Circuit; *J. F. Rowley Company vs. Rowley*, 193 Federal Reporter 390.)

**EFFECT OF WRITTEN CONTRACT.**—By reducing an agreement to writing, all prior and contemporaneous verbal agreements are supplanted. (Missouri Supreme Court, *Berberet vs. Myers*, 144 Southwestern Reporter 824.)

**RIGHT OF CORPORATION TO PURCHASE OWN STOCK.**—A corporation is entitled to purchase its own stock, in the absence of a statute to the contrary, objections by stockholders or prejudice to the company's creditors. (Michigan Supreme Court, *Cole vs. Cole Realty Company*, 135 Northwestern Reporter 329.) A corporation cannot validly agree to repurchase its own stock, in the absence of a statute permitting it to do so. (Maryland Court of Appeals, *Scaun vs. Brandt*, 82 Atlantic Reporter 551.)

**RESPONSIBILITY FOR INJURY TO CUSTOMER.**—An owner of a business establishment is not liable for death of a customer through falling down a stairway or freight elevator shaft, after entering a door leading into the shipping room, instead of using the entrance provided for customers. One's duty to use ordinary care for the safety of his customers on his premises is restricted to the parts of the premises to which they are invited. (Missouri Supreme Court, *Menteer vs. Scalzo Fruit Company*, 144 Southwestern Reporter 833.)

**ILLEGAL AGREEMENT FOR FREIGHT REBATE.**—A railroad company's agreement to refund to a shipper any part of the rate on an interstate shipment, lawfully collected, is unenforceable. (Kentucky Court of Appeals, *Louisville &*

*Nashville Railroad Company vs. Coquillard Wagon Works' Assignees*, 144 Southwestern Reporter 1080.)

**ASSUMPTION OF RISK BY SHIPPING EMPLOYEE.**—An employee experienced in moving heavy machines in shipping them assumed the risk of being injured by the tipping of a machine weighing 2900 pounds while it was being lowered from temporary skids. (Connecticut Supreme Court of Errors, *Tenney vs. Baird Machine Company*, 82 Atlantic Reporter 639.)

**ADEQUACY OF DAMAGES FOR PERSONAL INJURY.**—\$11,300 is not excessive recovery for injury to a machine shop foreman, consisting in loss of the sight of one eye and impairment of the other, except as to \$950 allowed by the jury for medicines and medical treatment without proof of such expense; where he earned \$175 a month and lost two months' work, suffering intense pain in the meantime, though he obtained other employment at the same salary. (Oregon Supreme Court, *Tuohy vs. Columbia Steel Company*, 122 Pacific Reporter 36.)

**INJURY IN DARK PLACE OF WORK.**—An employer is not responsible for injury to a workman while oiling machinery, through lack of light in the place, if the latter selected the time for doing his work, and if by waiting until later in the day the light would have been sufficient to enable him to perform his work safely. (Virginia Supreme Court of Appeals, *Riverside & Dan River Cotton Mills vs. Carter*, 74 Southeastern Reporter 183.)

**WHAT CONSTITUTES "SHAFTING?"**—As used in statutes requiring shafting to be guarded to prevent injury to workmen, the word "shafting" is limited to shafts or rods by which power is transmitted to machinery. (Missouri Supreme Court, *Cole vs. North American Lead Company*, 144 Southwestern Reporter 855.)

**PASSING OF TITLE UNDER C. O. D. SHIPMENT.**—Under a C. O. D. shipment title to the goods does not pass to the buyer until payment is made. (Oklahoma Supreme Court, *E. M. Brash Cigar Company vs. Wilson*, 121 Pacific Reporter 223.)

**CHattel MORTGAGES FOR PREFERENCE OF CREDITORS.**—A chattel mortgage of a merchant's stock to obtain funds to pay part of his creditors is not invalid as to the others because he is permitted to remain in charge of the stock, buying and selling in the ordinary course of business. (New Mexico Supreme Court, *First National Bank of Albuquerque vs. Haverkamp*, 121 Pacific Reporter 31.)

**INVALID AGREEMENT NOT TO RE-ENGAGE IN BUSINESS.**—An agreement not to re-engage in the business of manufacturing and selling certain articles for a period of five years is unenforceable as being in unlawful restraint of trade, where the agreement is not restricted as to the territory throughout which it is to operate. (Georgia Supreme Court, *Floding vs. Floding*, 73 Southeastern Reporter 729.)

**GOODS LOST AFTER DELIVERY BUT BEFORE INSPECTION BY BUYER.**—A buyer is liable for the price of goods destroyed by fire after delivery to him, though he has not had opportunity to exercise a right of inspection. (Kentucky Court of Appeals, *Howard vs. St. Louis Jewelry Company*, 142 Southwestern Reporter 241.)

**ACCEPTANCE OF PROPOSAL FOR SETTLEMENT UNDER CONTRACT OF SALE.**—Mere silence and failure to reply to a written proposal for settlement of a dispute under a contract of sale does not amount to an acceptance thereof, so as to constitute a binding agreement. (West Virginia Supreme Court of Appeals, *Carr vs. Coffman*, 73 Southeastern Reporter 275.)

**DURATION OF CONTRACT OF SALE.**—Letters written between May 26 and June 12 whereby plaintiff offered to sell castings to defendant up to defendant's requirements for "the next twelve months," and defendant accepted the offer, subject to shipment of not more than a fixed quantity each month, to be made within 45 days from receipt of defendant's specifications of sizes, constituted a contract expiring one year from June 12, and plaintiff was not bound to deliver castings which could not, in the usual course of business, be manufactured and placed on the cars during that year. (Kentucky Court of Appeals, *Haven Malleable Castings Company vs. W. E. Caldwell Company*, 142 Southwestern Reporter 227.)

**WHAT CONSTITUTES DOING BUSINESS BY FOREIGN CORPORATION?**—An Illinois manufacturing company did not engage in business in New York, so as to require it to comply with the laws of that state governing foreign corporations, though it received an order from a New York customer, and an agent who had an office in New York received notes for the purchase price and sent them to the company's home office, where the corporation maintained no place of business in New York and the agent did not represent it exclusively, but was also engaged in selling for other concerns. (New York Supreme Court, Second Appellate Division; *Acorn Brass Mfg. Company vs. Rutenberg*, 132 New York Supplement 600.)

## Trade Publications

**Ore Conveyors.**—Robbins Conveying Belt Company, Park Row Building, New York City. Bulletin No. 47. Is devoted to a description of typical ore and material handling plants in large mining and smelting operations. The special features of the company's belts, which are strength, flexibility, toughness and solidity, are touched upon and the troughing idlers and trippers are shown. A number of installations are shown and the halftone engravings are supplemented by line diagrams.

**Lighting.**—General Electric Company, Schenectady, N. Y. Two bulletins. No. 4897 illustrates and describes the new G-E Edison Mazda lamps for standard train lighting service, which are made in two voltage ranges, from 25 to 34 and 57 to 65, and in sizes of 15, 25 and 50 watts. The other bulletin, No. 4906, which is devoted to the lighting of textile mills, considers the influence of lighting upon the amount and cost of production, the quality of the product, the amount of spoilage and the safety of the employee. In this connection the new drawn wire Edison Mazda lamp, which is particularly suited to this class of illumination, is described. The bulletin also contains illustrations of various installations of these lamps and makes recommendations relative to the illumination of various departments of these mills.

**Grinding Machines and Wheels.**—Springfield Mfg. Company, Bridgeport, Conn. Series H. Shows the various types of wheels which can be supplied for different kinds of grinders as well as a number of machines. Among those illustrated are the Springfield-Brandes vertical grinding planer and the CM motor-driven grinder, both of which were illustrated in *The Iron Age* November 24, 1910, and March 23, 1911, respectively.

**Metal Sheets.**—Newport Rolling Mill Company, Newport, Ky. Pamphlet and folder. Treat of a number of different styles of open-hearth sheets which can be supplied in either black or galvanized finish. Other products include cold rolled and uniform color sheets, sheet stamping and special soft steel sheets; galvanized and painted roofing, siding, ceiling, etc.; corrugated sheets, arches and awnings; metal roofing of various kinds and siding. All of these are illustrated with brief descriptions of the various sizes in which they can be supplied.

**Motor Starters.**—Allen-Bradley Company, Milwaukee, Wis. Bulletins B-7 and B-8. Deal with the types Z and ZA automatic direct-current motor starters. Both starters are built in a number of sizes ranging from 1 to 100 hp., the difference between the two being that the latter has a knife switch and fuses mounted upon the panel. The resistance units used with these starters are of the Allen-Bradley carbon compression type, the resistance being secured through the imperfect contact between the surfaces of prepared graphite disks piled in a column and varied by subjecting the column to different degrees of pressure. An illustrated description of the type Z starter appeared in *The Iron Age* September 21, 1911, and the resistance unit itself was illustrated September 22, 1910.

**Autogenous Welding.**—The Oxy-Acetylene Appliance Company, 149 Broadway, New York City. Pamphlet. Treats of the various types of oxy-acetylene welding and cutting apparatus manufactured by the Davis-Bourneville Company. These are all illustrated and described. Some of the uses of the process are mentioned and a number of typical welds are illustrated.

**Shapers and Key Seating Machinery.**—Morton Mfg. Company, Muskegon Heights, Mich. Collection of loose leaf bulletins. Relates to various types of draw cut shapers and portable and stationary keyway cutters. The machines are described in the different bulletins at some length with illustrations and specification tables and engravings of some of the work done by them.

**Rock Drills.**—Ingersoll-Rand Company, 11 Broadway, New York City. Form No. 4108. Describes the B-104 Sergeant rock drill, which is especially adapted for driving small headings, stopping or similar work. This drill has a cylinder  $2\frac{1}{2}$  in. in diameter and will drill 20 in. of 1 to  $1\frac{1}{4}$ -in. hole without changing steel. Full specifications and details and a list of repair parts are included.

**Fans.**—Buffalo Forge Company, Buffalo, N. Y. Catalogue No. 199. Illustrates and describes the Conoidal fan, which is claimed to possess a high efficiency in the handling of air. The shape and arrangement of blades in this fan is a special feature since they are narrow at the front, providing a large and unobstructed intake and increase in width toward the back so that a part of the air is taken up by them before it strikes the hub. The construction of these fans is described at length and illustrations of the various parts and several of the different types built are shown. These fans are made for belt and direct-connected drives as well as with the wheel overhung on the motor shaft. Dimension tables for the various types of fans are given and test curves are also reproduced.

**Water Tube Boilers.**—E. Keeler Company, Williamsport, Pa. Catalogue. Size,  $7\frac{1}{2} \times 10\frac{1}{2}$  in.; pages, 46. This is the company's 1912 catalogue illustrating and describing a line of water-tube boilers which are built in both the standard and cross drum types. The construction of the two styles of boilers is described at length and the text is supplemented by a number of halftone engravings. Different places where these boilers are installed are

shown and the results of a number of tests are included. The various installations of boilers illustrated include oil and coal fuel and chain and shaking grates and underfeed stokers. Among the installations mentioned is that at Miraflores, Canal Zone. An illustrated description of the plant and the results of the tests made upon it appeared in *The Iron Age* November 10, 1911.

**Cupolas and Blowers.**—J. W. Paxson Company, Philadelphia, Pa. Bulletin No. 26. Calls attention to the Paxson-Coburn cupola, which is claimed to be a very economical melter. From 10 to 15 standard sizes of wind boxes are made so that it is possible to secure a variety of sizes of cupolas. The various portions of the cupola, such as the spark arrester, roof hood, wind gate and blast gates and pipes are illustrated. Different types of blowers for use with these cupolas are also shown and instructions on the charging and operating of a cupola are included. Mention is also made of various accessories such as scales, elevators, tools, linings, etc., together with a brief description of the various types of foundry refractory materials.

**Manganese Steel Chain.**—Taylor Iron & Steel Company, High Bridge, N. J. Supplement to bulletin No. 113. Calls attention to a recent reduction in prices of the Tisco manganese steel chain. The four different types of chain are illustrated and the prices for the various pitches and attachments required are included.

**Machine Shop Specialties.**—Gem Mfg. Company, Spruce street, near Thirty-third, Pittsburgh, Pa. Catalogue No. 6. Treats of a line of machine shop specialties which include steel and brass oilers, flue scrapers, flexible shafting, motor and rope driven portable grinders and drills and universal joints. All of these are illustrated and briefly described with tables of the sizes in which they can be supplied. A number of tables of useful information are included.

**Turbines.**—Triumph Mfg. Company, Springfield, Ohio. Catalogue. This is the company's 1912 catalogue describing and illustrating a number of types of turbines, water wheels and kindred lines. Tables are given showing the power and speed of the standard Triumph and small capacity turbines for high heads. Several installations are also shown.

**Tramrail Systems.**—Brown Hoisting Machinery Company, Cleveland, Ohio. Catalogue B and pamphlet S. The former describes the Brownhoist trolleys and electric hoists used in tramway systems for handling all kinds of materials. Uses of the system in power plants and for various purposes in industrial plants are illustrated and the engravings show the various types of hoists and trolleys. The pamphlet shows the Brownhoist suspended bin for coal and ash storage and the machines for handling material in connection with it. These bins are made in a number of different types all of which are illustrated.

**Screw Machine Products.**—National-Acme Mfg. Company, Cleveland, Ohio. Booklet entitled "Parts for the Trade." Illustrates numerous milled parts made in duplicate to customers' specifications and to order only. These include parts used in the construction of spark plugs, carbureters and magnetos, lubricators, sundry accessories, motor cycles, heavy machinery, registers and instruments, typewriters and phonographs, sewing and washing machines, hardware, tools, plumbing supplies, electrical construction work, motors, dynamos, railroad work and for various other purposes where milled parts in duplicate are required.

**Meters.**—Uehling Instrument Company, Passaic, N. J. Two bulletins. The first, No. 100, which is entitled "Combustion and the Cost of Power" contains a considerable amount of information concerning combustion and boiler efficiency with particular reference to how high boiler efficiency may be obtained by the use of the Uehling CO<sub>2</sub> meters and waste meters. After a discussion of the various losses and wastes occurring in the production of steam, seven different styles of equipment for measuring carbon dioxide alone or for both carbon dioxide and temperature are described in detail. Bulletin No. 103 is devoted to a line of CO<sub>2</sub> meters and waste meters which consists of machines for pneumatic measuring and six styles are shown. An illustrated description of the waste meter appeared in *The Iron Age*, May 29, 1911.

**Portable Floor Crane and Hoist.**—Canton Foundry & Machine Company, Canton, Ohio. Booklet. Describes and illustrates a portable floor crane and hoist for use in factories, shops, garages, lumber yards, etc. Nine sizes in all are built ranging in capacity from 3000 to 8000 lb. Mention is also made of other products of the company which include emery grinders and blacksmiths' forges.

**Iron, Steel and Metal.**—George Nash Company, 217 Pearl street, New York City. Price list D. Lists a large line of high grade steel specialties which include tool, cold rolled and tempered strip steel; spring and soft flat wire, cold rolled sheets, cold drawn key steel, shafting and polished drill rods. The index is arranged in the form of a table of contents and also alphabetically so that it is comparatively easy to find any particular kind of steel. Several useful tables of weights, sizes and equivalents are included.

**Pig Iron.**—Wickwire Steel Company, Buffalo, N. Y. Pamphlet. Embodies brief specifications of the various grades of foundry and forge, basic, malleable and Bessemer pig iron, produced by this company, as well as special irons made to purchasers' specifications. A brief description of the plant is given and this is supplemented by engravings.



